

CEDAR LAKE ENHANCEMENT  
ASSOCIATION, INC.  
Cedar Lake, Indiana



**CEDAR LAKE  
ENGINEERING FEASIBILITY STUDY**

**HARZA** Consulting Engineers and Scientists

March 1999

Property of  
Lake and River Enhancement Section  
Division of Fish and Wildlife/IDNR  
402 W. Washington Street, W-273  
Indianapolis, IN 46204

# **CEDAR LAKE ENGINEERING FEASIBILITY STUDY**

**Prepared for**

**Cedar Lake Enhancement Association, Inc.  
Cedar Lake, Indiana**

**Prepared by**

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**Under the Sponsorship of  
Indiana Department of Natural Resources  
Lake and River Enhancement Program**

**March 1999**

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## ACRONYMS

Al	Aluminum
ARDL	Applied Research Development Laboratory
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
CDF	Confined Disposal Facility
CFS	Cubic Feet per Second
CLEA	Cedar Lake Enhancement Association, Inc.
CN	Curve Number
CPOM	Course Particulate Organic Material
FIS	Flood Insurance Study
FPOM	Fine Particulate Organic Matter
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
ISWS	Illinois State Water Survey
LARE	Lake and River Enhancement Program, IDNR
MSL	Mean Sea Level
NWS	National Weather Service
NRCS	Natural Resources Conservation Service
NPS	Nonpoint Source
PCB	Polychlorinated Biphenyls
PREWet	Pollutant Removal Estimates for Wetlands
$Q_p$	Peak Flow
RAS	River Analysis System
SCS	Soil Conservation Service
SRP	Soluble Reactive Phosphorus
TCB	Total Coliform Bacteria
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

## **1.0 SUMMARY**

### **1.1 Background**

Cedar Lake is a valuable resource for the City of Cedar Lake and Lake County, Indiana. Cedar Lake, has historically, and continues to, offer a wealth of water sport activities for seasonal and yearly residents. Cultural eutrophication has affected the uses of the lake for decades. The most obvious symptoms of eutrophication are summer algae mats, sediment plumes seen in the lake following storm events, the large accumulation of sediment on the lake bottom, and reduction in water clarity.

Environmental researchers have studied the eutrophication of Cedar Lake for at least twenty years. This feasibility study is the latest of these investigations. It is an engineering feasibility study, aimed at identifying and evaluating practical and effective measures for improving water quality in Cedar Lake.

### **1.2 Local Action**

This document and the related report *Dredging Feasibility Study* were commissioned by the Cedar Lake Enhancement Association, Inc. (CLEA) through monies raised locally and from state grants. In the past four years, grants totaling \$340,000 have been matched with approximately \$80,000 in locally raised capital, and all have been invested in projects directed towards enhancement of Cedar Lake. The CLEA, Town of Cedar Lake, Cedar Lake Chamber of Commerce, Cedar Lake Parks & Recreation, Cedar Lake Summerfest, Inc., and the citizens of Cedar Lake continue to volunteer hundreds of hours of labor and in-kind services to enhance Cedar Lake.

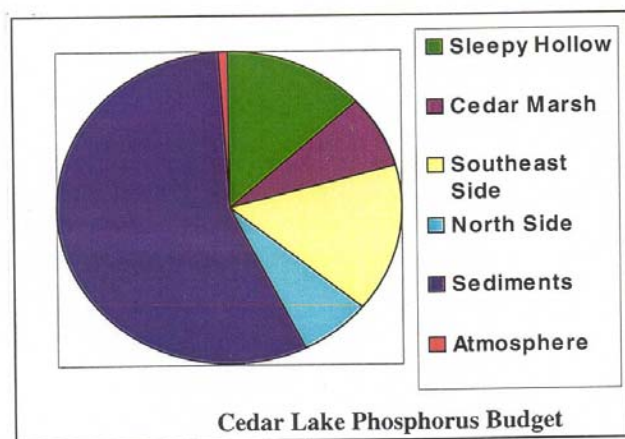
### **1.3 Lake Restoration Goals**

A lake trophic state evaluation model was prepared and used to predict the water quality benefits of watershed and lake management efforts. The model is based upon the limiting nutrient concept, assuming that reductions in nutrient loadings will reduce algae biomass in Cedar Lake.

Cedar Lake is a phosphorus-limited system. Currently, about 10 tons of phosphorus per year enter Cedar Lake from all sources. This is the principal cause of nuisance algae blooms and associated impairments. A reasonable lake restoration goal is to reduce these nutrient loadings by 50% within the

next five years. Most limnologists define eutrophic lakes as those with mean annual total phosphorus concentrations greater than about 0.02 mg/L. If this were our restoration goal, phosphorus loadings to Cedar Lake will need to be reduced to 900 kg/yr, or less than ten percent of current loadings! Hence, while this reduction will not result in Cedar Lake being reclassified to mesotrophic, a lower trophic state, reducing nutrient loadings by half is an aggressive, yet achievable restoration goal that will have significant ecological and socioeconomic benefits.

The sources of the 10 tons of phosphorus entering Cedar Lake are due to those shown in the inset. Reducing phosphorus loads requires addressing phosphorus in these pools, principally watershed



loadings, atmospheric deposition, and internal loadings (those recycled each year from the sediment). This last component is by far the greatest source of nutrients to Cedar Lake.

This engineering feasibility study has evaluated the most feasible measures to reduce these loadings. These studies have been used to prepare a comprehensive plan to reduce phosphorus loadings by 50% by the year 2003. The

feasibility studies addressed watershed (or external) loadings and sediment (or internal) loadings of phosphorus. Atmospheric phosphorus is less than one percent of the total load.

## 1.4 Restoration Projects

The feasibility evaluations have recommended four projects for implementation:

- Construction of a Wetlands Treatment System on Sleepy Hollow Ditch
- Stabilization of Sleepy Hollow Ditch Banks
- Removal of Contaminated Sediments from Cedar Lake
- Development of Additional Watershed Control Measures

These are described individually below. Combined they are expected to reduce the phosphorus loading to Cedar Lake by 5.5 tons per year, or 54%. Costs of implementing these projects is estimated to be \$9.8 million.

#### **1.4.1. Wetlands Treatment System on Sleepy Hollow Ditch**

Wetlands, whether natural or created, are depressed areas that slow stormwater runoff and allow sedimentation to take place. Wetlands support aquatic and hydric plants which aid in sedimentation and nutrient assimilation. Newly-formed constructed wetlands generally have soils capable of adsorbing large amounts of phosphorus. But, soil phosphorus adsorption capacity diminishes over time. Since wetlands provide opportunities for sedimentation and nutrient adsorption, and wildlife habitat, they are being considered here as a lake enhancement method.

Wetland morphology is an important determinant of effectiveness. Deeper wetlands have higher hydraulic detention times and hence higher sedimentation rates; but, there is less opportunity for nutrient binding with wetlands soils, the primary nutrient removal mechanism. During the design phase for wetlands, separate compartments will be included for sedimentation and nutrient removal as much as possible. This is generally accomplished through a check dam which separates the wetland part of the treatment system from the sedimentation basin. The sedimentation basin aids in collecting larger sediment particles and attenuating peak flows in order to protect the wetland system and assist in its treatment capabilities.

Some researchers have estimated that a newly constructed wetland system will remove 70% of the sediment phosphorus and 30% of the soluble phosphorus (McBrien *et al.*, 1998). Based on the water chemistry of Sleepy Hollow Ditch and using the before mentioned removal rates, the overall phosphorus removal with the wetland system will be 42%. A wetland system could be designed with a check dam outlet with elevation at about 714 MSL. With grading (excavation of 5,400 cubic yards) to provide additional storage capacity, this would provide a maximum storage capacity of about 7.64 acre-feet. This outlet dam could be preceded by a smaller check dam with an elevation at about 712 ft MSL. This smaller check dam would provide a sedimentation basin (1st basin) and a wetland basin (2nd basin). When filled to capacity, 90% of the system would have water depths less than four feet. This would provide the potential for adequate soil/water



interactions and aid in the development of a diverse aquatic community. Both of these factors would greatly enhance the pollutant removal capabilities of the system.

The systems design storage period (Y), a function of the design sediment storage capacity, average erosion rate in the watershed, a sediment delivery ratio for the watershed, the facility's trap efficiency, watershed area, a design storage period, and sediment density is about 2.5 years.

Construction costs of the wetland are estimated to be \$71,500; additional costs of land acquisition, permits, engineering and administration will be encountered as well.

#### **1.4.2. Stabilization of Sleepy Hollow Ditch Banks**

A survey of Sleepy Hollow stream banks revealed significant erosion problems. Tons of soil are lost each year to the lake, bringing additional sediment and nutrients to Cedar Lake. Erosion along Sleepy Hollow Ditch is most prevalent in areas with steep bank slopes or in areas with shallower bank slopes and woody vegetation. The thick grass cover along the stream banks in the upper stretches of the stream have provided adequate erosion protection.

Stabilizing these banks is considered critical to development of the wetland in that basin. Bank stabilization and wetland development in Sleepy Hollow are predicted to reduce phosphorus loadings to Cedar Lake by at least 270 kg each year.

Construction costs for stabilizing the eroding banks of Sleepy Hollow from the treatment wetland to the lake are estimated to be \$68,800, plus engineering, permitting, and administration.

#### **1.4.3. Reduction of Internal Phosphorus Loadings**

A separate, detailed engineering feasibility study was performed to evaluate alternatives, costs and benefits for reduction of internal, or sediment-driven, phosphorus loadings (Harza 1998). That examination of sediment confirmed the presence of deep, very nutrient rich sediments in the lake. Total phosphorus concentrations in the sediment average nearly 500 mg/kg and were found to be as high as 1,060 mg/kg, or 0.1%. Ammonia nitrogen in sediment averages 326 mg/kg (maximum = 797 mg/kg) and organic nitrogen as high as 8,500 mg/kg. These nutrient concentrations are extremely high, and

support the position of several past investigators, including Indiana University, that internal sources of phosphorus are quite significant in this system.

Dredging the lake will address this source of loading and produce water quality benefits commensurate with the amount of phosphorus removed from the system. For dredging projects of this magnitude, hydraulic dredges, typically using cutterheads, are used, with the spoil pumped to an upland confined disposal facility (CDF). Several acceptable locations for disposal of the sediment in a safe, environmental sound manner were identified. Upon project completion, the CDF would be regraded, reseeded, and if necessary, soil amendments added to adjust pH. The property could then be reused for agricultural activities, or the spoil sold as topsoil.

Three alternative dredging projects were evaluated (Table 1-1). Case I involves the removal of 130,000 cubic yards of sediment. This is the estimated volume of sediment removal that would be required to dredge seven to eight inches of sediment from the areas with the highest nutrient concentrations (about 120 acres). Case II proposes the removal of 670,000 cubic yards of sediment from Cedar Lake. This is the estimated volume of sediment removal that would be required to dredge seven or eight inches of sediment from the whole lake. Case III, the removal of 1.1 million cubic yards of sediment from the lake would have the greatest water quality benefits. If the goal of reducing phosphorus loadings by 50% is to be met, Case III should be implemented.

**Table 1-1**  
**ALTERNATIVE DREDGING SCENARIOS**

	<b>Case I</b>	<b>Case II</b>	<b>Case III</b>
Sediment Removed	130,000 yd <sup>3</sup>	670,000 yd <sup>3</sup>	1,100,000 yd <sup>3</sup>
CDF Area	35 acres	80 acres	100 acres
Construction Cost	\$2 million	\$5.7 million	\$9.5 million
Internal P Loading Reduction	2,560 kg/yr	3,410 kg/yr	4,270 kg/yr
Likely Chlorophyll a Reduction	21%	27%	34%

#### **1.4.4 Watershed Management - North and East of Lake**

Recent sampling indicated the presence of elevated coliform bacteria in sediment in areas on the north end of Cedar Lake. This area is of particular concern because of its proximity to a multi-family complex and its frequent use as a swimming area and beach. This project will identify and correct bacteria, nutrient and sediment loadings to the lake from the smaller inlets on the north and east sides of Cedar Lake. Anticipated actions could include constructed wetlands, sediment basins, bank erosion protection, or similar non-point source pollution control projects. It is estimated that these projects will cost approximately \$250,000.

Implementation of these small project on the north and east sides of Cedar Lake is estimated to reduce phosphorus loadings to Cedar Lake by 550 kg each year.

### **1.5 Recommendations**

The cumulative benefits of the four above-described projects will significantly improve ecological, environmental, and socioeconomic value of Cedar Lake. The table below quantifies some of the water quality benefits. Implementing these projects will also produce tangible and intangible socioeconomic benefits. For example, an additional 500 sport-effort fishing days at Cedar Lake would be valued at about \$30,000. An additional 500 boat-use days would be valued at about \$12,500, and an additional 500 day-use days about \$15,000. An even greater economic benefit would materialize for lakefront property owners. Lakefront properties command higher prices than comparable non-lake-front properties within the Cedar Lake area. The lakefront properties (and lake view properties) retain asking prices (not market clearing prices) about 25-40% greater than the other properties. Improvements to lake water quality would enhance the demand for lakefront (and view) properties, thus increasing land values and secondary tax base increases. Even relatively small changes to property values could represent several hundred thousands, or millions, of dollars of increased value.

**Table 1-2**  
**LAKE ENHANCEMENT BENEFITS**

Indicator	Existing Conditions	Sleepy Hollow Projects	Sleepy Hollow + Dredging	All Projects
P Loadings (kg/yr)	10,125	9,470	5,010	4,460
P concentration (mg/L)	0.23	0.22	0.12	0.10
Chlorophyll a (µg/L)	39	37	24	22

**Table 1-3**  
**SUMMARY TABLE**

	Wetland	Bank Stabilization	Dredging	North & East Side
Capital Costs	\$71,500	\$68,800	\$9.3 million	\$250,000
Phosphorus Load Reduction	6%	Minor	42%	5%
Number of Permits	5	3	5	5
No. Affected Landowners	1	8	unknown	unknown
Environmental Concerns	Minor	No	Minor	Undetermined
Unusual Social Costs	None	None	Temporary loss of agricultural land	Undetermined
Flooding Concerns	None; Poned water	None	None	Undetermined

## **2.0 INTRODUCTION**

### **2.1 Background**

In 1997, the Cedar Lake Enhancement Association (CLEA) was provided a grant under the Indiana Department of Natural Resources' (IDNR) "T by 2000" Lake and River Enhancement Program. The grant funds were used to procure the services of a consulting engineering firm to perform a lake enhancement engineering feasibility study. The CLEA, independent of the IDNR, also commissioned a lake dredging feasibility, portions of which are included in this report.

### **2.2 Objectives**

The lakeside residents and users of Cedar Lake have long expressed concern due to deteriorating water quality. In 1978 the Indiana State Legislature appropriated funds to determine the feasibility of restoring Cedar Lake (Echelberger, *et. al.*, 1979). Since 1978, a series of three reports have addressed water quality concerns and possible solutions at Cedar Lake. The objectives of the current study are to identify lake enhancement projects, to determine feasibility of anticipated construction projects, and to prepare for physical design. Among projects reviewed, key recommendations of Indiana University's 1991 Cedar Lake Enhancement Study were given high priority. They included:

- Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh
- Construction of a control structure at Pickerel Creek
- Rerouting of Hogpen Ditch to its original channel
- Blocking second (unnamed) outlet of Cedar Lake Marsh entering marina

### **2.3 Scope of the Study**

The feasibility study involved 19 tasks:

1. Update Outdated Parameters and Address Information Gaps
2. Project Progress Reporting
3. Identification of Potential Construction Sites
4. Complete Preliminary Engineering/Calculations
5. Facilitate Public Meetings Regarding the Proposed Project
6. Create a Public Information Handout
7. Determine Unusual Physical and/or Social Costs of the Proposed Project
8. Complete a Flood Stage Analysis if Determined Necessary
9. Determine Easements and Land Availability
10. Determine Functionality and/or Impact of Proposed Project with Respect to Condition of the Lake
11. Conduct a Wetland Functional Assessment or Vegetation Survey

12. Conduct a Survey of Biological and Habitat Integrity Downstream of Proposed Sites
13. Determine Funding Sources for Design and Construction Projects Including Ability of Local Entity to Fund Additional Project Phases
14. Conduct an Environmental Impact Assessment of Pre- and Post Project Conditions with Special Attention to Wetlands, Water Quality and Flooding
15. Document Justification for Proposed Site Selection
16. Complete Early Coordination Process for Obtaining all Project Permits Including USACE, IDEM, USFWS, IDNR, County Drainage Boards, and Pertinent Citizen Organizations
17. Complete Conceptual Drawings
18. Determine Preliminary Design and Construction Project Cost Estimates and Timelines
19. Complete Engineering Feasibility Report

## **2.4 Acknowledgments**

Harza would like to extend appreciation for the assistance given to the study team by the CLEA. Particularly valuable was the assistance and enthusiasm of the CLEA's Board and its President, Mr. Robert Gross, Jr.

Several individuals and agencies provided important and invaluable data and input for this study: the IDNR's Lake and River Enhancement (LARE) Office, and the Divisions of Fish and Wildlife, and Water; the Indiana Department of Environmental Management; the Lake County Soil Conservation Service; the Environmental Systems Application Center at the School of Public and Environmental Affairs at Indiana University; the United States Army Corps of Engineers; and, the Hanover Township Assessor's Office.

This report was written by Mr. Douglas Mulvey, the Project Engineer for this study. Also contributing were Mr. David Pott (Project Manager), Mr. Edward Belmonte (Environmental Scientist), and Mr. Wili Tolentino (Drafter). The LARE Program is administered by the IDNR Division of Soil Conservation.



### **3.0 DESCRIPTION OF THE STUDY AREA**

#### **3.1 Location**

Cedar Lake is located in the west central section of Lake County in northwestern Indiana (Figure 1). Cedar Lake is located approximately 35 miles southwest of Chicago and is approximately 1.5 miles east of U.S. 41.

#### **3.2 Lake Physical Characteristics**

Much of the available information on Cedar Lake has been gathered and published by other authors. Principal sources of information include Echelberger, Jr., *et al.* (1979), Echelberger, Jr., *et al.* (1984), and Jones and Marnatti (1991).

Cedar Lake is a 781-acre kettle lake with a maximum depth of 16 feet and a mean depth of 8.8 feet (Jones and Marnatti, 1991). A dam and gaging station are located at the outlet of the lake, Cedar Creek. The structure maintains a lake level of about 693 feet mean sea level (MSL), providing for a mean storage volume of approximately 6,875 acre-feet. The mean hydraulic retention time is 1.25 years. This lengthy hydraulic retention time has limnological significance for this lake enhancement effort:

- The lake has a high sediment trapping efficiency
- And a high phosphorus settling rate.
- Recovery time will also be lengthy.

The Cedar Lake shoreline is heavily developed with seasonal and year-round residences. The north and south ends of the lake have adjacent wetlands ranging in size up to 400 acres. Boating, fishing, water skiing, and swimming are popular activities on the lake (Jones and Marnatti, 1991).

#### **3.3 Watershed Characteristics**

Figure 2 shows a map of the Cedar Lake watershed. The total watershed area exclusive of the lake is 4,780 acres. The watershed drains into Cedar Lake primarily through three inlets from the south and southwest sides. Two of the inlets (Pickerel Creek and an unnamed outlet near Pine Crest Marina) drain Cedar Lake Marsh, a 400-acre wetland to the south of Cedar Lake. Cedar Lake Marsh in turn drains approximately one-half of the total watershed area. The third inlet is Sleepy Hollow Ditch on the southwest side of the lake. Sleepy Hollow Ditch drains an area of approximately 1,250 acres or approximately one-quarter of Cedar Lake's watershed (Figure 3). Land use in the Cedar Lake watershed is estimated as 4% forest lands, 9% wetlands, 24% urban lands, and 63% agricultural and open lands. Land usage in the Sleepy Hollow Ditch watershed is estimated as follows: 77.4% agricultural, 4.5% commercial/industrial, 14.5% residential, and 0.6% forested.

Hydrologic data for this study came from the National Weather Service (NWS), United States Geological Survey (USGS), and the Illinois State Water Survey (ISWS). There is a USGS maintained stream gage on Cedar Creek just downstream of the dam on Cedar Lake. Precipitation data was compiled from the Valparaiso, Indiana Waterworks Building for the period 1920-1996. Based upon these seventy-six years of data, a mean yearly rainfall of 38.37 inches (with a standard deviation of 6.56 inches, a maximum of 57.77 inches, and a minimum of 24.05 inches) was calculated.

National Wetlands Inventory maps for Lowell and St. John, Indiana were obtained from the US Fish and Wildlife Service (Figure 4). In general, the majority of areas defined as wetlands are located on the north, south and east sides of the lake.

### **3.4 Soils**

The soils in the Cedar Lake watershed are of the Plainfield-Watseka association. These soils are identified as moderately sloping to nearly level, excessively drained and somewhat poorly drained soils that formed in coarse-textured glacial outwash (USDA SCS, 1992).

Soils in the Sleepy Hollow Ditch watershed are generally classified as Pewanmo silty clay loam and Morley silty loam. Pewanmo silty clay loams are soils of 0 to 2 percent slopes and are nearly level or depressional. These soils have a medium-textured or moderately fine textured surface layer and a moderately fine textured subsoil. Permeability is moderately slow or slow and the water table is at or near the surface late in winter and early in spring. During heavy rainfall events, soil erosion is a hazard. Morley silty loam are soils of 2 to 12 percent slopes and are deep, moderately well drained, medium-textured, gently to moderately sloping soils. Permeability is slow and erosion potential is moderate to severe.

### **3.5 Water and Sediment Quality**

Cedar Lake has historically experienced degraded water quality. Effluent from improperly installed and/or maintained on-site septic systems contributed significant quantities of nutrients, bacteria and biochemical oxygen demand (BOD) to Cedar Lake up to the mid-1970s when construction of a wastewater collection system was completed and shoreline residents began hook up to the system (Jones and Marnatti, 1991). With development of the sewage collection and treatment system, lake water quality began to improve, but still remains poor. The 1998 Indiana Fish Consumption Advisory (IDNR *et al.*, 1998) lists a moderate Fish Consumption Advisory for PCBs. Table 3-1 presents Indiana Volunteer Lake Monitoring Program data for 1996 and 1997.

**Table 3-1****LAKE MONITORING PROGRAM WATER QUALITY DATA (1996-1997)**

Year	Total P ( $\mu\text{g/L}$ )	Secchi Depth (feet)	Chlorophyll <i>a</i>
1996	167	0.9	37.8
1997	225	0.9	128.3

Clearly Cedar Lake has high concentrations of nutrients and very poor water clarity. These recent results compare with historical results (Table 3-2), suggesting that the natural recovery rates for nutrient assimilation will be on the order of decades unless sediment and nutrients are controlled before discharge to Cedar Lake.

Echelberger *et al.* performed water sampling and analysis in 1979 and 1982. Water from three sampling locations at three different depths were collected and analyzed. For simplicity, all sampling locations and depths were combined to provide an average lake concentration. Results of this sampling are presented in Table 3-2. For Sleepy Hollow Ditch, a series of samples were collected during the same time frame at the mouth of the Ditch where it discharges into Cedar Lake. Results of this sampling are presented in Table 3-3.

**Table 3-2****WATER CHEMISTRY OF CEDAR LAKE (1979-1982)**

Source: Echelberger *et al.*, 1984

	Dissolved Oxygen (ppm)	pH	Alkalinity (ppm as $\text{CaCO}_3$ )	Conductivity ( $\mu\text{mhos-cm}$ )	Total P ( $\mu\text{g/L}$ )	Soluble Reactive P ( $\mu\text{g/L}$ )
Mean	8.4	8.2	129.1	396	221	85
Standard Deviation	3.1	0.7	13.6	36.3	76	61
Maximum	14.3	9.3	182	500	394	195
Minimum	2.1	6.5	102	340	47	1

	$\text{NH}_3^{+1}$ (mg/L)	$\text{NO}_3^{-2}$ (mg/L)	TKN (mg/L)	Chlorophyll ( $\text{mg/m}^3$ )	Turbidity (NTU)	Secchi Depth (cm)
Mean	1.2	0.4	2.6	61.9	17.7	37.6

	NH <sub>3</sub> <sup>+</sup> <sup>1</sup> (mg/L)	NO <sub>3</sub> <sup>-2</sup> (mg/L)	TKN (mg/L)	Chlorophyll (mg/m <sup>3</sup> )	Turbidity (NTU)	Secchi Depth (cm)
Standard Deviation	2.2	0.5	0.9	36	8.2	10.6
Maximum	17.2	2.6	5.3	155	39	59
Minimum	0	0	0.8	4.5	1	21.5

For water sampling performed during 1979-1982, the mean water column total phosphorus (TP) concentration in Cedar Lake was 221 µg/L of which 85 µg/L was soluble reactive phosphorus (SRP). Results of Indiana's Volunteer Lake Monitoring Program of Cedar Lake for 1996 and 1997 show a mean TP concentration of 225 and 167 µg/L, respectively. These average concentrations are based on one sample taken during July or August of 1996 and 1997. Therefore, these data suggest that water quality conditions in Cedar Lake are similar to those during the 1979-1982 sampling period.

**Table 3-3**  
**WATER CHEMISTRY OF SLEEPY HOLLOW DITCH (1979-1982)**

Source: Echelberger *et al.*, 1984

	Dissolved Oxygen (ppm)	pH	Alkalinity (ppm as CaCO <sub>3</sub> )	Conductivity (µmhos-cm)	Total P (µg/L)	Soluble Reactive P (µg/L)
Mean	8.6	7.2	121.7	547.3	245	177
Standard Deviation	3.8	0.6	70.4	206.3	233	130
Maximum	13	7.7	220	740	740	367
Minimum	2.3	5.8	6.2	290	50	52

	NH <sub>3</sub> <sup>+</sup> <sup>1</sup> (mg/L)	NO <sub>3</sub> <sup>-2</sup> (mg/L)	TKN (mg/L)	Chlorophyll (mg/m <sup>3</sup> )	Turbidity (NTU)	Secchi Depth (cm)
Mean	0.6	3.2	1.6	2.3	16.9	NA
Standard Deviation	0.8	3.9	0.9	2.2	13.6	NA
Maximum	2.1	8.6	3.3	4.2	38	NA

	NH <sub>3</sub> <sup>+</sup> <sup>1</sup> (mg/L)	NO <sub>3</sub> <sup>-2</sup> (mg/L)	TKN (mg/L)	Chlorophyll (mg/m <sup>3</sup> )	Turbidity (NTU)	Secchi Depth (cm)
Minimum	0.1	0.1	0.5	0	3.9	NA

NA = Not Available

For comparison, the United States Environmental Protection Agency (USEPA) National Eutrophication Survey (USEPA, 1974) considered TP concentrations above 20 µg/L to be representative of eutrophic lakes. Therefore, Cedar Lake has high phosphorus concentrations, and would be considered by the USEPA to be eutrophic.

Sleepy Hollow Ditch water quality (Table 3-2) data indicate that TP, SRP, and conductivity concentrations are greater than those of Cedar Lake. Nitrate concentrations are also considerably higher in Sleepy Hollow Ditch. Given the fact that a majority of Sleepy Hollow Ditch's watershed is agricultural land and that average conductivity measurements are high, sediment and nutrient loadings to Cedar Lake through Sleepy Hollow Ditch appears to be of concern.

Harza collected and analyzed twenty-two sediment samples and water quality parameters in July 1998 (Figure 5). Sediment samples were collected with a weighted hollow-stem sediment corer. Samples for analysis were collected in plastic sleeves and transferred to a stainless steel bowl where they were homogenized, classified, and transferred to glass jars. These samples were stored on ice for shipment to Applied Research Development Laboratory (ARDL), Mt. Vernon, Illinois, for analysis. At sediment sampling locations, water quality parameters were also monitored. These included water temperature, dissolved oxygen, conductivity, pH, water depth, and Secchi depth. All sediment samples were analyzed for total Kjeldahl nitrogen (TKN), ammonia nitrogen, TP, total solids, total organic carbon (TOC), particle size analysis, and hydrometer. Ten of the samples were analyzed for polychlorinated biphenyls (PCBs). Results are presented in Table 3-4.

Six near shore sediment samples (Figure 5) were also collected in July 1998 for *Escherichia coli* analysis. The samples were collected with a stainless steel hand auger and transferred to Whirlpaks™ and stored on ice until transferred to the Lake County Health Department for analysis. Results are presented in Table 3-5.

Figures 6 through 10 present isopleth maps of sediment concentrations of TP, TKN, ammonia nitrogen, TOC, and percent fines, respectively. Results from these analyses suggest that the lake sediments are highly contaminated with phosphorus. Samples also contain relatively high percentages of organic matter, which may reflect the lake's eutrophy and high level of autochthonous productivity. This is most evident in the deeper parts of the lake (> 5 ft). *Escherichia coli* results suggest that the inlet on the north end of the lake which drains a small watershed poses some concern to swimmers.

**Table 3-4**  
**SUMMARY OF FIELD AND LABORATORY RESULTS FOR SEDIMENT SAMPLING**

Sample Location	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08
Classification	Sandy silt (ML)	Sandy silt (ML)	Silty sand (SM)	Silty sand (SM)	Silty sand (ML) with a few clay	Silty sand (SM)	Sandy silt (ML)	Silty sand (SM)
% fines (< # 200 sieve)	53	54	41	37	47	37	53	45
PCBs ( $\mu\text{g/Kg}$ )	NA	NA	ND	NA	ND	NA	ND	NA
Kjeldahl Nitrogen (mg/Kg)	2790	7340	8580	7970	412	7070	7900	5650
Ammonia Nitrogen (mg/Kg)	46.2	601	298	385	21.9	686	520	693
Total Phosphorus (mg/Kg)	308	666	464	536	221	456	947	656
Total Solids (%)	40.3	24.4	21.1	21.1	79.1	20.9	24.3	21
Total Organic Carbon (mg/Kg)	96600	59500	109000	81700	23300	90300	68800	86800
Water Temperature ( $^{\circ}\text{C}$ )	27	28	27	27	27	27	27	27
Air Temperature ( $^{\circ}\text{C}$ )	28	28	29	29	28	27	28	27
Dissolved Oxygen (mg/L)	7.8 @ 2'	7.7 @ 3'	7.8 @ 3'	6.7 @ 3'	8.4 @ 3'	6.25 @ 4' 6.0 @ 7'	6.4 @ 4' 5.96 @ 7'	7.2 @ 4' 6.5 @ 7'
Conductivity ( $\mu\text{MHOS}$ )	312	315	312	310	312	310	308	300
pH	9.17	9.01	9.1	9.19	9.28	9.05	9.15	9.16
Water Depth (ft)	9.3	14	11	12	5	14	13.5	13.5
Secchi Depth (ft)	0.95	1	0.85	0.9	0.85	0.95	0.85	0.95

Sample Location	SS-08	SS-09	SS-10	SS-11	SS-12	SS-13	SS-14
Classification	Silty sand (SM)	Sandy silt (ML)	Silty sand (SM)	Poorly graded sand (SP) with trace silt	Sandy silt (MH) with trace clay	Sandy silt (ML)	Silty sand (SM)
% fines (< # 200 sieve)	45	52	44	3	62	60	34
PCBs ( $\mu\text{g/Kg}$ )	NA	ND	NA	ND	NA	NA	ND
Kjeldahl Nitrogen (mg/Kg)	5650	7660	7320	151	8060	6400	8020



Sample Location	SS-08	SS-09	SS-10	SS-11	SS-12	SS-13	SS-14
Ammonia Nitrogen (mg/Kg)	693	237	797	4.4	404	675	202
Total Phosphorus (mg/Kg)	656	395	725	72.6	588	581	524
Total Solids (%)	21	19.2	21	80.2	18	21.3	20.2
Total Organic Carbon (mg/Kg)	86800	132000	99400	1090	132000	94200	86000
Water Temperature (°C)	27	27	27	27	29	27.5	27
Air Temperature (°C)	27	28	27	28	28	28	27
Dissolved Oxygen (mg/L)	7.2 @ 4' 6.5 @ 7'	8.1 @ 4'	7.35 @ 4' 5.10 @ 7'	6.85 @ 4'	8.6 @ 4'	8.8 @ 4'	7.50 @ 4'
Conductivity (μMHOS)	300	308	308	303	285	300	302
pH	9.16	9.38	9.53	9.18	9.51	9.31	9.41
Water Depth (ft)	13.5	10	14.5	6.7	9.5	14	13.5
Secchi Depth (ft)	0.95	1	1.1	1	1.05	1	0.95

Sample Location	SS-15	SS-16	SS-17	SS-18	SS-19	SS-20	SS-21	SS-22
Classification	Clayey silt (MH) with a little sand	Silty sand (SM)	Poorly graded sand with silt (SP-SM)	Silty sand (SM)	Sandy silt (ML)	Sandy silt (MH) with a little clay	Silt with sand (ML)	Sandy silt (ML)
% fines (< # 200 sieve)	88	47	12	38	52	60	75	66
PCBs (μg/Kg)	ND	NA	ND	NA	NA	ND	NA	ND
Kjeldahl Nitrogen (mg/Kg)	6140	6930	1400	5900	6480	324	6370	3400
Ammonia Nitrogen (mg/Kg)	150	558	43.6	239	207	30.8	238	129
Total Phosphorus (mg/Kg)	268	539	370	1060	468	250	411	363
Total Solids (%)	23.8	23.8	61.7	21.1	22.4	78.5	21.8	30.4
Total Organic Carbon (mg/Kg)	119000	98100	16000	93400	107000	28700	106000	64800
Water Temperature (°C)	28	28	28	26	26.5	26	26	26
Air Temperature (°C)	25	26	26	27	26	23	24	25

Sample Location	SS-15	SS-16	SS-17	SS-18	SS-19	SS-20	SS-21	SS-22
Dissolved Oxygen (mg/L)	9.5 @ 3'	8.5 @ 4'	8.60 @ 3'	6.60 @ 5'	7.5 @ 3'	6.55 @ 3'	7.25 @ 4'	7.75 @ 3'
Conductivity ( $\mu$ MHOS)	300	300	305	298	302	290	295	290
pH	9.27	9.47	9.7	9.26	9.07	9.21	9.22	9.41
Water Depth (ft)	9.5	13	6.5	10.5	9	7	9.5	7.5
Secchi Depth (ft)	1.05	1	1.05	0.85	0.9	0.9	0.9	0.95

**Table 3-5**

**SUMMARY OF LABORATORY RESULTS FOR SEDIMENT SAMPLING FOR  
*Escherichia coli***

Sample Identification	<i>Escherichia coli</i> Count
SEC-01	>30,000
SEC-02	<1
SEC-03	<1
SEC-04	<1
SEC-05	<1
SEC-06	<1

Concurrently with the above sediment sampling effort, Harza also collected and analyzed 22 sediment samples and water quality parameters in July 1998; details of this study are given in the Dredging Feasibility Report. The sediment samples were analyzed for total Kjeldahl nitrogen (TKN), ammonia nitrogen, total phosphorus, total solids, total organic carbon (TOC), particle size analysis, and hydrometer.

Figures 6 through 11 present isopleth maps of sediment concentrations of total phosphorus, TKN, ammonia nitrogen, TOC, and percent fines, respectively. Results from these analyses suggest that the lake sediments are enriched with nitrogen and phosphorus. Samples also contain relatively high percentages of organic matter, which may reflect the lake's eutrophy and high level of autochthonous productivity. This is most evident in the deeper parts of the lake (> 5 ft).

### **3.6 Sleepy Hollow Bank Conditions**

On August 6 and 7, 1998, Harza visually assessed bank conditions along Sleepy Hollow Ditch from the inlet at Cedar Lake to just upstream of the Monon Railroad line. The survey followed a significant rainfall event which had occurred earlier in the week. Therefore, the stream, which had been reported dry before the inspection, had small flows of approximately two to three cubic feet per second (cfs).

For this condition assessment, Sleepy Hollow Ditch was partitioned into eight segments, as referenced in Figure 11.

**Section 1:** Sleepy Hollow Ditch from the inlet into Cedar Lake to Lauerman Street is straight and both banks seem to be adequately protected. The channel is approximately 12-foot wide and 4-foot deep. Evidence of erosion on these steep banks is minimal as rip-rap and mixed concrete debris along with woody vegetation, trees and underbrush, protect the banks.

**Section 2:** From Lauerman Street upstream to 142nd Place the channel is approximately 15-foot wide and 3-foot deep. Up to a confluence where a small branch joins Sleepy Hollow Ditch, the banks are protected with sporadic trees, undergrowth, and grassed lawns. There is little evidence of erosion up to the confluence. The right overbank (looking downstream) is protected in cut bank areas with concrete rubble. The small channel which joins Sleepy Hollow Ditch at the confluence is approximately 4-foot wide and one-foot deep in this area. The channel slopes up sharply to a bank height of approximately four feet. This channel was nearly dry at the time of inspection. Upstream of the confluence to 142nd Place the channel becomes wider, approximately 20 feet wide with 4 feet banks. Fine sediment is prevalent in the channel in this area. Erosion is also noted as there is no bank protection other than sporadic vegetation (Michigan Field Cane) and some underbrush. Erosion is most prevalent on the left overbank (looking downstream) as the banks are steeper. There is evidence of flooding (debris, sediment deposition, knocked down weeds) in this area, perhaps due to the culvert under Lauerman (a 8-foot wide by 4-foot deep concrete box culvert) being underized, or back water effects from the lake.

**Section 3:** Between 142nd Place and 142nd Avenue, Sleepy Hollow Ditch winds through residential areas and runs along Lauerman Street. The cut banks in this stream segment have been armored with concrete debris to protect against erosion.

**Section 4:** Between 142nd Avenue and 141st Avenue, Sleepy Hollow Ditch follows along Lauerman Street up to around 141st Place where it jogs away from Lauerman into a wooded area up to 141st Avenue. Along Lauerman Street, the stream runs between the road and lawns where intermittent armoring is provided. Erosion in this area is minimal. Where Sleepy Hollow turns away from Lauerman Street and runs through the wooded area, the stream bed widens and becomes shallow. Erosion is more prevalent in this area where trees and woody vegetation

are the only erosion protection means. Nearer to 141st Avenue, the left overbank (looking downstream) is protected. The steep right overbank (looking downstream) is eroded and susceptible to additional erosion.

**Section 5:** From 141st Street up to Birch Street, Sleepy Hollow Ditch runs through residential areas. Both overbanks of the stream are generally maintained by lawns with minimal erosion protection measures. A small check dam is located about midway along this stretch which aids in reducing water velocities. A tile drain discharges into the stream in this area near the check dam. During inspection a significant flow of water was being transmitted via this tile drain. Because the flood plains are shallow in this area, erosion is minimal as the flood water escapes the channel and flows in the flood plain effectively reducing flow velocities. Near 141st Avenue, banks are susceptible to erosion as slopes are steeper.

**Section 6:** Sleepy Hollow Ditch runs parallel to Birch Street in the next stream segment. This area is wooded and woody underbrush is also prevalent. In general, erosion is common throughout this whole area as banks are steep and erosion protection is limited to sporadic vegetation.

**Section 7:** From Birch Street to the Monon Line the channel is lined mainly with dense grasses and sporadic woody vegetation and trees. The grasses have greatly reduced erosion in this area as the channel is very narrow and quite deep. In areas where the grasses have been replaced by woody vegetation and trees, the channel widens and depth decreases and erosion is evident. Slopes are relatively shallow along the stream, providing a large floodplain area; but, slopes increase on both sides of the stream as one approaches agricultural fields. There is a 100-foot-wide buffer strip on each side of the stream composed of grasses and woody vegetation.

**Section 8:** Between the Monon Railroad and upstream approximately 200 feet the stream floodplain is composed predominately of heavy covers of grasses and sporadic woody vegetation. The stream channel is deep and not very wide in this area. Erosion is minimal in this area as the grasses have effectively provided protection.

In summary, erosion along Sleepy Hollow Ditch is most prevalent in areas with steep bank slopes or in areas with shallower bank slopes and woody vegetation. The thick grass cover along the stream banks in the upper stretches of the stream have provided adequate erosion protection. Figure 11 provides a location of the most severe erosion or erosion potential.

### **3.7 Other Resources**

The DNR Division of Nature Resources was contacted during this study. They checked the Indiana Natural Heritage Program's database and sent a letter regarding their concerns. In summary, the

Division had the following comments:

1. Cedar Lake Marsh is identified as a “Significant High Quality Community”
2. Horned pondweed (*Zannichellia Palustris*) has been identified as a “state endangered” species present in Cedar Lake Marsh

In early September 1998, further communication with the Division of Natural Preserves indicated that horned pondweed was collected in 1930 in some unknown location in Cedar Lake Marsh. It is the Division’s opinion that the plant no longer exists at the site and as a result, they “have no objections to the proposed diversion of Sleepy Hollow Ditch through the marsh adjacent to Cedar Lake.”

The United States Department of the Interior, Fish and Wildlife Service was also contacted during this study. A letter was sent regarding their concerns. In summary, the Service had the following comments:

1. Cedar Lake is within the range of the federally endangered Indiana bat (*Myotis sodalis*) and the Karner blue butterfly (*Lycaeides melissa samuelis*), and the federally threatened Meads milkweed (*Asclepias meadii*).
2. All Karner blue records are from northern Lake and Porter Counties. There are no Indiana bat or Meads milkweed records from the project vicinity. Some bat habitat may exist in forested areas in the lake’s watershed.
3. The German Methodist Cemetery on the west side of U.S. 41 highway contains a remnant prairie plant community.

## 4.0 LAKE ENHANCEMENT ALTERNATIVES

### 4.1 Problem Statement

Cedar Lake is a valuable resource for the City of Cedar Lake and Lake County. Cedar Lake has historically and continues to offer a wealth of water sport activities for seasonal and yearly residents. The uses of the lake are being impacted by the cultural eutrophication of the lake. The most obvious symptoms of this eutrophication are summer algae mats, sediment plumes seen in the lake following storm events, the large accumulation of sediment on the lake bottom, and reduction in water clarity.

### 4.2 Approach

The purpose of an engineering feasibility study is to identify, screen, and compare project alternatives and to select one or more alternatives for further study or design. Alternative methods for enhancing Cedar Lake were evaluated using a two-level procedure, with the depth of study increasing as the list of alternatives narrowed to those most feasible. The evaluation involves:

**Identification and Screening** - A comprehensive list of reasonable lake enhancement methods was compiled. Alternatives which were obviously not applicable to Cedar Lake, had unacceptable environmental impacts, or unproven technology were eliminated from further consideration.

**Feasibility Evaluation** - Alternative methods were evaluated for technical feasibility for enhancing Cedar Lake. The alternatives remaining for evaluation at this level of study were prioritized for implementation based on effectiveness and cost.

### 4.3 Identification and Screening

For the purposes of lake enhancement, we have focused our study on alternative methods to reduce sediment and phosphorus loadings to Cedar Lake. While there is evidence that other pollutants are impairing lake use (*Escherichia coli* numbers impairing contact recreation, PCBs impairing fish consumption), we have attempted to address the severity of those sources and causes. However, reductions in sediment and phosphorus loadings will generally have the greatest benefits to lake quality.

Phosphorus to nitrogen ratios in Cedar Lake indicated that phosphorus is the nutrient limiting primary productivity in the lake; reductions in phosphorus availability will increase water clarity and decrease algae and chlorophyll levels. A comprehensive list of a lake enhancement measures was generated from compiling the recommendations of past investigators, recent workshops held with lake users, and expertise of the engineer. Alternative lake enhancement projects include: diversion of Sleepy Hallow Ditch, blocking a Cedar Lake Marsh outlet, re-routing of Hogpen Ditch, construction of a control structure at Pickerel Creek, pumping of dilution water into Cedar Lake, dredging of Cedar Lake, alum



treatment in Cedar Lake, detention structure on Sleepy Hollow Ditch, in-stream alum treatment and sedimentation on Sleepy Hollow Ditch, detention structure on the creek leading from the South Shore Country Club, sedimentation basins at the inlets to Cedar Lake Marsh, lake aeration, and biomanipulation. Appendix 1 presents a technical memorandum which lists and discusses alternatives for reducing phosphorus concentrations and sediment runoff into Cedar Lake. This memorandum further presents comments reflecting the applicability, potential benefits, and negative aspects of each alternative.

Today at Cedar Lake, nonpoint sources, coupled with internal recycling, of phosphorus are the greatest causes of water quality degradation. Since one-half of the Cedar Lake's watershed drains through 400-acre Cedar Lake Marsh, treatment of this source of potential sediment and nutrients is considered adequate. One-quarter of the lake's watershed drains through Sleepy Hollow Ditch without any sediment or nutrient controls. Therefore, our study of phosphorus and sediment control alternatives concentrated on the Sleepy Hollow Ditch watershed. Harza also recommended that a dredging feasibility study be undertaken (Harza, 1998) to assess the potential and costs of controlling internal recycling of phosphorus within Cedar Lake.

Nonpoint source control of phosphorus inputs to the lake is generally linked with control of soil erosion and sedimentation through BMPs and/or sediment traps. Phosphorus is generally transported in streams adsorbed to soil particles, so removal of the soil particles from the stream system frequently removes incoming phosphorus as well. Wetland creation (sediment traps) on Sleepy Hollow Ditch was recommended for more detailed study. An alum treatment system, followed by sedimentation, was also recommended for further study as this has a potential for phosphorus and soil erosion collection before deposition into Cedar Lake. Streambank erosion, a minor source of sediment being carried into the lake, was also carried forward for more detailed study. Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh was also carried through to the feasibility level as deposition of nutrients and sediments into Cedar Lake Marsh would benefit Cedar Lake's water quality.

#### **4.4 Feasibility Evaluation**

The following sections provides an overview of each of the projects carried through to the feasibility evaluation level.

##### **Option 1: Wetlands Treatment System on Sleepy Hollow Ditch**

Wetlands, whether natural or created, are depressed areas that slow stormwater runoff and allow sedimentation to take place. Wetlands support aquatic and hydric plants which aid in sedimentation and nutrient assimilation. Newly-formed constructed wetlands generally have soils capable of adsorbing large amounts of phosphorus. But, soil phosphorus adsorption capacity diminishes over time. Since wetlands provide opportunities for sedimentation and nutrient adsorption, and wildlife habitat, they are being considered here as a lake enhancement method.

Wetland morphology is an important determinant of effectiveness. Deeper wetlands have higher hydraulic detention times and hence higher sedimentation rates, but there is less opportunity for nutrient binding with wetlands soils, the primary nutrient removal mechanism. Richardson (1985) found that phosphorus retention by wetlands can be predicted solely by knowing the extractable aluminum content of the soil. During the design phase for wetlands, we recommend that separate compartments be included for sedimentation and nutrient removal as much as possible. This is generally accomplished through a check dam which separates the wetland part of the treatment system from the sedimentation basin. The sedimentation basin aids in collecting larger sediment particles and attenuating peak flows in order to protect the wetland system and assist in its treatment capabilities.

Some researchers have estimated that a newly constructed wetland system will remove 70% of the sediment phosphorus and 30% of the soluble phosphorus (McBrien *et al.*, 1998). Based on the water chemistry (177  $\mu\text{g/L}$  soluble vs. 68  $\mu\text{g/L}$  sediment phosphorus as shown in Table 3-2) of Sleepy Hollow Ditch and using the before mentioned removal rates, we estimate that the overall phosphorus removal with this wetland system will be 42%. A wetland system, located at Area 1 (Figure 12), could be designed with a check dam outlet with elevation at about 714 MSL. With grading (excavation of 5,400 cubic yards) to provide additional storage capacity, this would provide a maximum storage capacity of about 7.64 acre-feet. This outlet dam could be preceded by a smaller check dam with an elevation at about 712 MSL. This smaller check dam would provide a sedimentation basin (1st basin) and a wetland basin (2nd basin) (Figures 13 and 14). When filled to capacity, 90% of the system would have water depths less than four feet. This would provide the potential for adequate soil/water interactions and aid in the development of a diverse aquatic community. Both of these factors would greatly enhance the pollutant removal capabilities of the system.

The systems design storage period (Y) was calculated. Y is a function of the design sediment storage capacity, average erosion rate in the watershed, a sediment delivery ratio for the watershed, the facility's trap efficiency, watershed area, a design storage period, and sediment density. Appendix 2 provides these calculations. We estimate that the cleaning period of the system will be every 2.5 years, on average.

### **Option 1-A: Wetlands Treatment System on Sleepy Hollow Ditch**

An alternate or additional location for a wetland treatment system could be Area 1-A (Figure 12). This area has recently been identified as potentially available for development. There is approximately 320 linear feet of stream which runs through these two property parcels owned by the same individual. A series of two check dams as described above could be designed to separate a wetland system from a small sedimentation basin. Because changes in elevation are very gradual in this area of the stream, excavation would be required to provide any significant storage capacity. Assuming a system of length 300 feet, average width of 125 feet, and maximum depth of four feet, with side slopes of 15 to one, an excavation volume of about 3,000  $\text{yd}^3$  of dirt would be required. This small system would provide a runoff storage volume of approximately 1.75 acre-feet. Utilized as the only sediment and nutrient

control on Sleepy Hollow Ditch, it is estimated that this system would require yearly sediment extraction.

### **Option 2: Alum Treatment and Sedimentation on Sleepy Hollow Ditch**

Another potential lake enhancement technique could use an alum treatment station on Sleepy Hollow Ditch followed by sedimentation in a basin in Cedar Lake (Figure 15). This technique would use dosing equipment to apply alum to Sleepy Hollow Ditch water based on runoff volumes. The alum and runoff mixture would then discharge into a sedimentation basin located in Cedar Lake and where it would be allowed to settle, and later removed.

Phosphorus precipitation and inactivation using alum is a well demonstrated lake enhancement technique. The stream phosphorus content is reduced by precipitating phosphorus from the water column and allowing it to settle into detention basin where the resulting floc can be easily removed. Phosphorus is removed through the formation of an insoluble precipitate, by the sorption onto the surface of alum flocs, and by occlusion and sedimentation of P-containing particles in these flocs (Cooke and Kennedy, 1981).

Aluminum (Al) salts are the most commonly used for inactivating phosphorus in lakes, streams, and stormwater. Al salts, generally alum or aluminum sulfate, are applied typically in liquid form, to the incoming stream. Al to phosphate ratios for chemical removal of 75% of the phosphorus is estimated 1.2 aluminum to one phosphorus. Actual implementation of an alum treatment system would require several batch tests to refine the dose.

There is some potential for adverse ecological effects with this method. Dissolved aluminum is toxic to aquatic biota at levels in excess of approximately 50  $\mu\text{g/L}$  (Cooke *et al.*, 1986), but this level is strongly pH dependent. At increasing differences from a neutral pH (7.0), Al is increasingly soluble. Also, the hydrolysis reaction that occurs when alum is mixed with water lowers pH. Consequently, a lake's alkalinity (neutralization capacity) is an extremely important consideration in planning alum applications; pH should be monitored during implementation.

Following alum dosing, the stormwater and alum mixture is allowed to mix and settle in a detention basin. Alum dosing could be performed in Sleepy Hollow Ditch just before discharge into a sedimentation basin constructed in Cedar Lake. A semicircular check dam as shown in Figure 15 could be designed out to the 6-foot contour in Cedar Lake. The dam could be designed to protrude up to one foot above the existing water surface. This structure would encompass a surface area of 1.6 acres, provide a storage capacity of 6.4 acre-feet, and extend 300 feet into Cedar Lake. Flocculated sediments and phosphorus would settle out in the basin and deposit to the basin bottom because of the extended detention time provided by the basin. Collection within the basin allows a convenient and relatively cheap collection means for settled floc. If floc was allowed to settle in the lake bottom, it would be resuspended by waves and boat traffic leading to increased sedimentation in the lake as well as

aesthetic impacts on it.

### **Option 3: Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh**

Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh (Figure 16) has been suggested by other investigators (Jones and Marnatti, 1991). This alternative was initially declined because of the presence of rare plant species and high quality communities as discussed in Section 3.7. Upon further consultation with the IDNR, they stated that these records were historical and the reported species was probably not present and therefore they would allow discharge into the marsh.

Diversion of the stream would require an 1,000-foot-long open channel with a maximum depth of 13 feet and a maximum width of 86 feet. Development of this channel will require loss of a substantial number of mature hardwood trees and disposal of a large quantity of spoil. The channel bottom width would be eight feet, similar to the present channel, with side slopes of 3:1. Bottom elevation at the diversion point in Sleepy Hollow Ditch would be approximately 694 MSL. The outlet in Cedar Lake Marsh would be at 693 MSL. This would provide a slope of 0.1%. Assuming an average water depth of two feet in Cedar Lake Marsh or a free water surface elevation of 695 MSL, a one foot head difference between the channel outlet invert (693 MSL) and the channel inlet invert (694 MSL) would potentially cause the wetland to surcharge into Sleepy Hollow Ditch until this head difference was equilibrated. In other words, during periods of low or no flow in Sleepy Hollow Ditch, given sufficient water heights in Cedar Lake Marsh, the channel could reverse flow and drain some of Cedar Lake Marsh into Sleepy Hollow Ditch.

An estimated removal volume of 8,500 cubic yards is required to excavate the channel with dimensions as described above. Figure 17 provides a schematic of the channel invert elevation with respect to the surrounding ground surface contours.

### **Option 4: Stream Bank Stabilization Along Sleepy Hollow Ditch**

As a result of the streambank survey discussed in Section 3.6, a few areas of moderate erosion protection along Sleepy Hollow Ditch would be beneficial to lake water quality and stream habitat. The areas, as identified in Figure 11, are generally in wooded areas along the stream where underbrush growth is sporadic or banks are steep. Stream bank stabilization measures such as rip-rap and/or vegetative erosion control measures are suitable for use in these areas.

### **Option 5: Lake Dredging**

Our examination of sediment quality confirmed the presence of very nutrient rich sediments in the lake. Total phosphorus concentrations in the sediment average nearly 500 mg/kg and we measured concentrations as high as 1,060 mg/kg, or 0.1%. Ammonia nitrogen in sediment averages 326 mg/kg (maximum = 797 mg/kg) and organic nitrogen as high as 8,500 mg/kg. These nutrient concentrations

are extremely high, and support the position of previous investigators that internal loadings are quite significant in this system.

Dredging the lake will address this source of loading and produce water quality benefits commensurate with the amount of phosphorus removed from the system. Harza evaluated the technical, environmental and economic costs and benefits of dredging in a separate study commissioned by the CLEA. For dredging projects of this magnitude, hydraulic dredges, typically using cutterheads, are used, with the spoil pumped to an upland confined disposal facility (CDF).

Three alternative dredging projects were evaluated. Case I involves the removal of 130,000 cubic yards of sediment. This is the estimated volume of sediment removal that would be required to dredge seven to eight inches of sediment from the areas with the highest nutrient concentrations (about 120 acres). Case II proposes the removal of 670,000 cubic yards of sediment from Cedar Lake. This is the estimated volume of sediment removal that would be required to dredge seven or eight inches of sediment from the whole lake. Case III, the removal of 1.1 million cubic yards of sediment from the lake would have the greatest water quality benefits.

Six potential CDF sites were identified from a review of available maps and site visits. Site selection criteria included the proximity of the site to the lake, proximity to an outlet site (stream, lake, river, or wetland), elevation (head) difference, amount of sediment to be dredged, natural topography, amount of potentially available land, presence of environmentally sensitive areas (forests, wetlands), construction access, and construction concerns (i.e., power lines, railroad tracks, tile drains, etc.). All sites were deemed to be suitable for CDFs. A site with typical distances and elevation changes, and agricultural land use was selected for cost estimating purposes. The selected site has a convenient drainage swale leading to the earlier mentioned constructed wetland on Sleepy Hollow Ditch; the wetland could provide additional treatment of the CDF effluent before returning to Cedar Lake. Upon project completion, the CDF would be regraded, reseeded, and if necessary, soil amendments added to adjust pH. The property could then be reused for agricultural activities, or the spoil sold as topsoil.

## **5.0 FEASIBILITY AND DESIGN CONSIDERATIONS**

### **5.1 Hydraulic Analysis**

A preliminary hydraulic and hydrologic analysis was performed to determine the potential for sediment and nutrient control within the Sleepy Hollow Ditch watershed. For the purpose of this hydraulic and hydrologic analysis, the Sleepy Hollow Ditch watershed has been modeled as 4 sub-basins with generalized basin characteristics (Figure 18). This level of analysis is acceptable for a preliminary feasibility analysis; however, a more detailed basin model will need to be developed during the final design and permitting phase. Preferably, the final model should be calibrated against flow monitoring data to confirm the representation of the model to the basin hydrology.

#### **5.1.1 Objectives of the Hydraulic Analysis**

The preliminary hydraulic model is based upon existing land use in the Sleepy Hollow Ditch watershed; this pattern of land use is not expected to change significantly in the near to medium term. Using these simulation conditions, analyses were performed to determine the hydrologic and hydraulic impact of proposed projects along Sleepy Hollow Ditch.

Two critical project sites have been analyzed (Figure 12). Site 1 is located between Birch Street and the Monon Line. This site was evaluated as Option 1, an on-stream wetland treatment site utilizing low head check dams to provide detention and flow attenuation. Site 2 is located at the inlet of Sleepy Hollow Ditch into Cedar Lake. This site was evaluated as Option 2, an alum treatment system utilizing a large check dam constructed in Cedar Lake to allow sedimentation of alum floc following alum dosing.

#### **5.1.2 Hydraulic Analysis Methodology**

The hydraulic analysis was performed to provide an initial assessment of the potential benefits of the on-stream facilities. Key elements of the analysis included:

- Selection of appropriate design events;
- Characterization of the Sleepy Hollow Ditch watershed;
- Definition of drainage sub-basins appropriate for runoff analysis;
- Assignment of sub-basin surface characteristics;
- Development of basin runoff hydrographs using a hydrologic model;
- Development of a hydraulic model representing the stream channel through the study area;
- Use of the hydraulic model to assess storage capabilities and water surface levels for potential projects at Sites 1 and/or 1-A and 2.

Aspects of the model development and application are described below.

### **5.1.3 Analysis Design Event**

Engineers have historically characterized rainfall events in terms of their recurrence interval. The recurrence interval associated with a particular rainfall event is the average period of time that would be expected between occurrences of that storm when considering a long period of record. For example, a rainfall event with a 10-year recurrence interval has a 10% probability of being equaled or exceeded in any give year. Similarly, an event with a 100-year recurrence interval has a 1% probability of occurring or being exceeded in a given year.

Design criteria used for stormwater management facilities in Indiana are commonly based on a 10% annual risk (10-year storm) of flooding for streets, and a 1% annual risk (100-year storm) of overtopping of detention basins or overbank flooding from waterways. Depth-duration-frequency data for typical Illinois and western Indiana storms are described in the Illinois State Water Survey Bulletin 70 (Huff, 1989). 24-hour rainfall events with 1, 2, 5, 10, 25, 50, and 100 year return periods were used as design storm for the evaluation of the Sleepy Hollow Ditch projects. For the analysis of alternatives, a 3rd quartile distribution was selected as the design rainfall distribution. In a third quartile event, the peak intensity of the storm occurs during the third quartile to the storm. For a 24-hour event, this means that the peak intensity occurs between 12 hours and 18 hours after the start of the storm.

### **5.1.4 Sleepy Hollow Ditch Watershed and Runoff**

Figure 18 presents the Sleepy Hollow Ditch watershed and runoff sub-basins selected for this study. The basin boundaries were determined from examination of the area drainage patterns from topographic maps. Additionally, sub-basins were selected to allow assignment of differing basin characteristics to represent existing conditions.

Hydrologic parameters were selected to best represent the current characteristics of the drainage sub-basins. Parameters that determine these characteristics include SCS curve number (CN), time-of-concentration, and catchment area. The SCS curve number models the amount of rainfall that becomes runoff in the catchment, with higher numbers corresponding to higher rates of runoff. The time-of-concentration parameter represents the time required for runoff to move across the catchment.

Sub-basin parameters for existing land use are shown in Table 5-1. While it is recognized that additional development within these areas is likely in the future, it is assumed that the Town's development and detention ordinances will result in effective management of increased stormwater flows. Thus, no dramatic increase in upstream flows to the project areas is anticipated.

**Table 5-1****SUB-BASIN HYDROLOGIC BASIN CHARACTERISTICS**

Sub-Basin	Area (acres)	$T_c$ (hours)	$T_t$ (hours)	CN
1	910	2	.38	82
2	157	.53	.35	81
3	203	2.3	.145	81
4	11.5	.20	.08	80

$T_c$  = Time of Concentration; time required for water to travel overland to the stream

$T_t$  = Time of Travel; time required for water to travel via streamflow to the next basin

**5.1.5 Hydrologic Model of Basin Runoff**

Two computer models were used in the preliminary hydraulic analysis: a hydrologic model to compute the rainfall runoff from the watershed and a hydraulic model to compute the water levels and flow rates along the stream channel. This section describes the hydrologic model. The following section describes the hydraulic model.

A hydrologic computer model of the watershed was developed to determine the inflow hydrograph at various locations along Sleepy Hollow Ditch. For this analysis, the computer program TR-55 Version 2.00 was used to develop the hydrographs. TR-55 was used to calculate peak flows ( $Q_p$ ) using the SCS method. The SCS method utilizes information on soil storage, as characterized by CNs, to predict the runoff volume resulting from rainfall. A unit hydrograph procedure is then used to distribute the runoff in time ( $t_c$ ). TR55 also provides runoff volumes and runoff hydrographs for modeled design storms. The TR-55 output is included in Appendix 3. The drainage basin was divided into four sub-basins to identify inflows at key locations. The location and hydrologic parameters used to represent these drainage basins were described in the preceding sections.

Table 5-2 shows a comparison of the drainage areas and peak discharges at various locations along the stream.



**Table 5-2****COMPARISON OF TRIBUTARY AREAS AND PREDICTED PEAK FLOWS (in cfs)**

Location	1-Year Discharge	2-Year Discharge	5-Year Discharge	10-Year Discharge	25-Year Discharge	50-Year Discharge	100-Year Discharge
Sub-Basin 1 (Wetland)	308	451	674	885	1200	1496	1852
Sub-Basin 3 (Confluence)	60	88	133	175	240	300	373
Sub-Basin 4 (Alum Basin)	127	187	280	367	508	638	795
Total Watershed Discharge	346	502	741	966	1313	1637	2029

Table 5-3 provides runoff volumes as a function of return period and sub-basin.

**Table 5-3****COMPARISON OF TRIBUTARY AREAS AND PREDICTED RUNOFF (in inches)**

Location	1-Year Runoff	2-Year Runoff	5-Year Runoff	10-Year Runoff	25-Year Runoff	50-Year Runoff	100-Year Runoff
Sub-Basin 1 (Wetland)	1.01	1.41	2.03	2.61	3.54	4.41	5.46
Sub-Basin 2	0.95	1.34	1.95	2.52	3.44	4.31	5.35
Sub-Basin 3 (Confluence)	0.95	1.34	1.95	2.52	3.44	4.31	5.35
Sub-Basin 4 (Alum Basin)	0.90	1.28	1.88	2.44	3.34	4.20	5.23

Table 5-4 presents total flow volumes for different design storms for different sub-basin areas within the Sleepy Hollow Ditch watershed.

**Table 5-4****PREDICTED TOTAL FLOW VOLUMES (acre-feet) BASED ON DESIGN STORM**

Location	1-Year Runoff Volume	2-Year Runoff Volume	5-Year Runoff Volume	10-Year Runoff Volume	25-Year Runoff Volume	50-Year Runoff Volume	100-Year Runoff Volume
Sub-Basin 1 (Wetland)	80	112	161	207	280	349	432

Location	1-Year Runoff Volume	2-Year Runoff Volume	5-Year Runoff Volume	10-Year Runoff Volume	25-Year Runoff Volume	50-Year Runoff Volume	100-Year Runoff Volume
Sub-Basin 4 (Alum Basin)	94	133	196	254	348	438	545

### 5.1.6 Verification of the Hydrologic Model

Whenever possible, it is desirable to check hydrologic and hydraulic modeling results against actual measurements of field conditions. This process provides a basis for refinement of the model, and establishes a certain level of confidence in its predictive capability.

Since Sleepy Hollow Ditch is an ungauged stream, no record of actual flows exist. Also, there is no Flood Insurance Study (FIS) data or stream gauge data for Sleepy Hollow Ditch. As a part of the design phase a comprehensive design dependant reanalysis of the entire Sleepy Hollow Ditch watershed should be completed in order to accurately estimate the flow rates and volumes for the Sleepy Hollow Ditch watershed.

### 5.1.7 Development/Application of the Hydraulic Model

To route the hydrographs developed with the TR-55 model through the study area, HEC River Analysis System (RAS) Version 2.1 was used (USACE, 1995). HEC-RAS is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. HEC-RAS Version 2.1 supports steady flow water surface profile calculations. The steady flow component is capable of modeling subcritical, supercritical, and mixed flow regime water surface profiles. The basic computational procedure is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's equation) and contraction/expansion (coefficient multiplied by the change in velocity head). The momentum equation is utilized in situations where the water surface profile is rapidly varied. These situations include mixed flow regime calculations (i.e., hydraulic jumps), hydraulics of bridges, and evaluating profiles at river confluences (stream junctions). The effects of various obstructions such as bridges, culverts, weirs, and structures can also be modeled. Capabilities are also available for assessing the change in water surface profiles due to channel improvements and levees. Outputs from the HEC-RAS modeling include X-Y plots of the river system schematic, cross-sections, profiles, rating curves, hydrographs, and many other hydraulic variables.

For modeling of Sleepy Hollow Ditch, a series of 32 stream cross section profiles and seven culvert or bridge systems were incorporated into the HEC-RAS model. The HEC-RAS model requires an input of  $Q_p$ s. A series of  $Q_p$ s were calculated based on 24 hour design storms with return periods of 1, 2, 5, 10, 25, 50, and 100 years.  $Q_p$ s were calculated using TR-55 as discussed above and displayed in Table 5-2.

### 5.1.8 Preliminary Hydraulic Modeling Results

Preliminary hydraulic modeling results suggest that with sufficiently sized outflow weirs, the wetland systems poses no concerns of flooding above the desired detention heights. During the design phase, a more comprehensive model which sizes the outlets based on the inlet hydrology, should be undertaken. Since the systems are restricted to small sizes because of potential land availability restrictions, their most notable contributions are during small and frequent storm event on the order of two-year storms and less. During less frequent, larger storms (> 5 year storms), the systems become inundated and provide minimal changes in stream hydrology and hydraulics.

### 5.1.9 Modeling of Wetland Treatment System

The Pollutant Removal Estimates for Wetlands (PREWet) Version 2.1 screening model was designed with the objective of estimating the removal efficiency for specific pollutants by a wetland given a limited amount of basic information about the wetland. PREWet is a screening-level assessment, developed by the U.S. Army Waterways Experiment Station in Vicksburg, Mississippi.

PREWer uses yearly estimates of hydrologic parameters (eg. surface area, volume, and flow) to estimate the percent reduction in total suspended solids (TSS), total coliform bacteria (TCB), BOD, total nitrogen (TN), and TP. Tables 5-5 and 5-6 presents input data and the resulting output data for two different scenarios, a constructed wetland (new) and a wetland in equilibrium (old).

**Table 5-5**  
**PREWet MODELING DATA FOR CONSTRUCTED WETLANDS**

#### Input Data

Average Annual Wetland Length (m)	304.8
Average Annual Wetland Surface Area (m <sup>2</sup> )	9712
Average Annual Wetland Volume (m <sup>3</sup> )	878856
Average Annual Flow Volume (m <sup>3</sup> )	5316
Average Annual Flow Velocity (cm/s)	30.48

#### Assumptions

- 5 $\mu$ m particle size
- particle specific gravity = 2.7
- particulate phosphorus = 80% total phosphorus
- *constructed wetland (new)*

## Output

TSS removal rate (%)	94
TCB removal rate (%)	37
BOD removal rate (%)	48
TN removal rate (%)	4
TP removal rate (%)	90

**Table 5-6**  
**PREWet MODELING DATA FOR EXISTING WETLAND**

## Input Data

Average Annual Wetland Length (m)	304.8
Average Annual Wetland Surface Area (m <sup>2</sup> )	9712
Average Annual Wetland Volume (m <sup>3</sup> )	878856
Average Annual Flow Volume (m <sup>3</sup> )	5316
Average Annual Flow Velocity (cm/s)	30.48

## Assumptions

- 5 $\mu$ m particle size
- particle specific gravity = 2.7
- particulate phosphorus = 80% total phosphorus
- **wetland in equilibrium (old)**
- fraction of total inorganic phosphorus in sediment to total phosphorus in sediment = 0.5
- fraction of inorganic phosphorus in water column to total phosphorus in water column = 0.5
- bonding energy constant for phosphorus sorption = 1 mg/L
- total phosphorus loading = 5.3 kg/day
- max phosphorus sorption = 1 mg/g
- 0 m/d resuspension velocity
- calculated mass transfer velocity (diffusion across sediment/ water interface) = 0.947 m/day
- calculated active sediment layer bulk density = 1534 g/L
- net settling rate = 1.61 m/day
- calculated active layer burial velocity = 0.0001047642 m/day

## Output

TSS removal rate (%)	94
TCB removal rate (%)	37

BOD removal rate (%)	48
TN removal rate (%)	4
TP removal rate (%)	45

Output from this model suggests that a newly constructed wetland will reduce phosphorus concentrations 90% and an old system will reduce concentrations 45%. It should be noted that this model provides only rough estimates of removal potential, that are similar to what we would expect from experience.

## 5.2 Lake Response

The effects of alternative lake and watershed management measures on water quality can be estimated using empirical equations, such as those described by Chapra (1997). We took the limiting nutrient approach to lake trophic state evaluation; this approach assumes that reductions in the nutrient source that controls primary production will reduce algae biomass in Cedar Lake. Echelberger *et al.*, 1979 in their Clean Lakes Phase 1 Diagnostic-Feasibility Study of Cedar Lake, stated that nitrogen was the limiting nutrient. Our examination of their data and more recent water quality data, and comparison of nitrogen-to-phosphorus ratios in water with the stoichiometric nutrient requirements of phytoplankton, does not confirm this. Cedar Lake is currently a phosphorus-limited system. Our experience indicates that only severely polluted freshwater systems are nitrogen-limited. While Cedar Lake may have historically been impacted by domestic sewage so as to approach nitrogen limitation, loadings have been greatly diminished and primary production in the system is now clearly limited by the availability of phosphorus.

Effects on lake water quality were estimated in a two-fold procedure. First, loadings to the lake from all sources were estimated using the unit areal loading concept. Then, the loadings were routed through the lake using an empirical equation that incorporates the two principal phosphorus sinks in lakes: flushing and sedimentation.

Land uses of the Cedar Lake watershed are tabulated below (Table 5-7); agriculture predominates, but significant urban and wetland areas are also in the basin.

**Table 5-7**

### **LAND USE/COVER IN THE CEDAR LAKE WATERSHED**

<b>Land Use/Cover</b>	<b>Area (ac)</b>	<b>Area (ha)</b>
Residential	855	346
Commercial & Industrial	85	35

Land Use/Cover	Area (ac)	Area (ha)
Wetland	419	170
Forest	134	54
Golf Course	116	47
Agriculture	3,015	1,220
Total	4,624 ac	1,872 ha

Phosphorus exported from these land use areas were estimated as the product of phosphorus export coefficients (Table 5-8) and land areas. Other sources included in the loadings estimate were atmospheric deposition and internal (sediment derived) loadings, the latter derived by Echelberger *et al.*, 1979. The sum of all loadings, under baseline, or current, conditions was estimated to be 10,100 kg P/yr (Table 5-9). Phosphorus loadings under several future scenarios, reflecting alternatives lake management measures, were developed from this baseline model.

**Table 5-8**

**UNIT AREA PHOSPHORUS EXPORT COEFFICIENTS (kg/ha-yr)**

Source	Export Coefficients
Residential	1.5
Commercial & Industrial	1.5
Wetland	-0.2
Forest	0.1
Golf Course	3
Agriculture	3
Atmosphere	0.3
Sediments	18

The effectiveness of individual lake enhancement measures upon lake phosphorus loadings from 3% for diversion of Sleepy Hollow Ditch into Cedar Lake Marsh, to 42% for full-lake dredging. Assumptions for phosphorus removal efficiencies were:

- The new wetland proposed for Sleepy Hollow Ditch would have a phosphorus removal efficiency of 42%
- Alum treatment of Sleepy Hollow flows would reduce loadings from that tributary by 80%
- Cedar Lake Marsh would remove 20% of phosphorus from flow diverted from Sleepy Hollow Ditch
- Dredging would reduce internal phosphorus loadings from 45% (Case I) to 75% (Case III)

The response of lake water quality to these changes in nutrient loadings were estimated using the following equation:

$$P = 0.1 \frac{L/A}{11.6 + 1.2 q_s}$$

where P is the mean annual lake total phosphorus (TP) concentration (mg/L), L is TP loadings to the lake (kg/yr), A is the lake surface area in hectares, and  $q_s$  is the surface hydraulic loading rate, estimated to be 2.1 m/yr. Table 5-10 provides the results of the lake response computations.

Under all scenarios, Cedar Lake is predicted to remain eutrophic. Most limnologists define eutrophic lakes as those with mean annual TP concentrations greater than about 0.02 mg/L. If this were our restoration goal, phosphorus loadings to Cedar Lake will need to be reduced to 900 kg/yr, or less than ten percent of current loadings!

Sources of uncertainty in these lake response estimates are significant. Principal uncertainty factors inherent to this include:

- Use of an empirical model developed from other North American lakes to estimate mean annual phosphorus concentrations; Cedar Lake is, at best, on the margins of the hydraulic and chemical ranges reflected in the data set used to build Reckhow's model.
- Uncertainty regarding the unit area loading coefficients, particularly internal loading of phosphorus in an aerobic system.
- Uncertainty regarding the effectiveness of each lake management alternative under study.
- Predicting Secchi disk depth (as an estimator of lake clarity) is not possible for Cedar Lake because much of the lake's turbidity is resuspended solids from boat traffic, wind-generated waves, and roiling of the bottom by carp.

The uncertainty associated with the baseline model was estimated through the computation of confidence limits. There is a 90% chance of the actual mean annual phosphorus concentration lying between 0.10 and 0.41 mg/L; recent grab sample measurements are well within this range.

**Table 5-9**  
**PHOSPHORUS LOADING ESTIMATES (kg/yr) UNDER BASELINE AND**  
**ALTERNATIVE LAKE MANAGEMENT MEASURES**

Source	Baseline Conditions	Proposed Wetland	Alum Treatment	Diversion of Sleepy Hollow into Marsh	Dredging Case I	Dredging Case II	Dredging Case III
Area upstream of Site 1 on Sleepy Hollow Ditch	1,059	614	212	848	1,059	1,059	1,059
Downstream remainder of Sleepy Hollow	303	303	61	242	303	303	303
Rest of watershed	2,981	2,981	2,981	2,981	2,981	2,981	2,981
Sediment	5,689	5,689	5,689	5,689	3,129	2,276	1,422
Atmosphere	95	95	95	95	95	95	95
Total	10,127	9,682	9,038	9,855	7,567	6,714	5,860

**Table 5-10**  
**LAKE RESPONSE ESTIMATES**

Source	Baseline Conditions	Proposed Wetland	Alum Treatment	Diversion of Sleepy Hollow into Marsh	Dredging Case I	Dredging Case II	Dredging Case III
Total phosphorus concentration (mg/L)	0.23	0.22	0.20	0.22	0.17	0.15	0.13
Chlorophyll a concentration (µg/L)	39	37	36	38	31	29	26



### **5.3 Permit Requirements**

Several different state and federal permits and approvals are required by each of the alternative lake enhancement developments. The State of Indiana Department of Natural Resources requires a joint permit application for construction within a floodway of a stream or river, navigable waterway, public fresh water lake, and ditch reconstruction. The joint application can be used for: (1) alternation of the bed or shoreline of a public freshwater lake; (2) construction or reconstruction of any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within ½ mile of the lake; (3) construction within the floodway of any river or stream; (4) placing, filling, or erecting a permanent structure in; water withdrawal from; or material extraction from; a navigable waterway; (5) extraction of mineral resources from or under the bed of a navigable waterway; and (6) construction of an access channel. A copy of the permit application is presented in Appendix 4.

The Indiana Department of Environmental Management requires a Section 401 Water Quality Certification (WQC) to conduct any activity that may result in a discharge into waters of the United States. In general, anyone who is required to obtain a permit from the U.S. Army Corps of Engineers (USACE) to engage in dredging, excavation, or filling activities must obtain a WQC. Examples of projects that likely require a USACE permit and WQC include: dredging a lake, river, stream, or wetland; filling a lake, river, stream, or wetland; bank stabilization; pond construction in wetlands; and roadway/bridge construction projects involving water crossings. A copy of the permit application is also included in Appendix 4.

The Detroit USACE requires permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping into ocean waters. A copy of the permit application is included in Appendix 4.

The IDEM Rule 5: Storm Water Runoff Associated with Construction Activity, is intended to reduce pollutants in storm water discharges into surface waters of the state. The requirements of Rule 5 apply to all persons who are involved in construction activity that results in the disturbance of five acres or more or total land area. A copy of the permit application is also included in Appendix 4.

A Dam Safety Permit is required by the IDNR if the area of concern meets at least one of the following three requirements: watershed area of 1 square mile and greater, dam height of at least 20 feet, and a detention volume of 100 acre-feet. Drainage areas for the wetland treatment system and the alum treatment basin both exceed the 1 square mile (640 acres) or greater.

**Table 5-11**

**PERMIT REQUIREMENTS**

	Wetlands	Alum Treatment	Ditch Diversion	Bank Stabilization	Dredging
Floodway Permit	●	●	●	●	●
401 Certification	●	●	●	●	●
USACE Permit	●	●	●	●	●
IDEM Rule 5	●		●		●
Dam Safety Permit	●	●			●

## 5.4 Project Funding

Appendix 5 lists a variety of agencies providing funding for projects which address water quality, erosion control, storm water, nonpoint source pollution, wetlands, and wildlife. Funding agencies include the branches of the United States Department of Agriculture (Natural Resources Conservation Service (NRCS) and the United States Forest Service), branches of the United States Department of Interior (Fish and Wildlife Service and the Bureau of Reclamation), the United States Environmental Protection Agency, and the United States Corps of Engineers. Many of these funding agencies provide money to the states which in turn fund such programs as IDEM's Section 319 Nonpoint Source (NPS) Program. Other programs are financed at the state level, such as the LARE Program.

Not all the programs identified involve grants. Some provide long term low interest loans to fund particular projects. In general, most of the programs require cost share requirements specifying non-federal contributions from 5 to 75%. There is currently policy and programmatic revisions underway at IDEM that will make non-point source control project eligible for financing by the State Revolving Loan Fund. This is an important new facet of the SRF and presents a significant financial resource for watershed managers in the state.

The SRF was created by the Clean Water Act Amendments in 1987 and has most commonly been used to finance municipal wastewater collection and treatment projects. Indiana's SRF Program offers low-interest loans to qualified communities for the planning, design, and construction of publicly-owned wastewater facilities. The SRF currently provides the lowest cost financing for these wastewater projects. The program is jointly managed by the IDEM and the State Budget Agency (SBA). IDEM is SRF Program administrator and the SBA is financial manager. Currently, IDEM is revising its policy and, in about two years, when the policy goes into effect, nonpoint source projects will be eligible for SRF financing. Together, the EPA and the State of Indiana have provided over \$342 million to the

SRF through 1998. Although future funding is uncertain, the program will be self-sustaining through the repayment of the loans. Communities eligible to apply for SRF loans are political subdivisions including incorporated cities and towns, counties, townships, municipal corporations, conservancy districts, sanitary districts, and regional water, sewer and waste districts.

The 1995 session of the General Assembly passed Senate Bill 66 to provide a three tiered interest rate policy for the SRF program. The new policy allows the SRF program to be more affordable to communities, especially Indiana's poorer communities. The interest rate available to a community is based on the median household income (MHI) of the service area. In addition, a community may be eligible for 0% interest for up to two years depending upon the communities' MHI. The interest rate policy is outlined in the table below.

**Table 5-12**

**SRF INTEREST RATE POLICY**

<b>Tier</b>	<b>Median Household Income (MHI)</b>	<b>Interest Rate *</b>	<b>0% Period</b>
Base	greater than 100% of the State nonmetropolitan MHI > \$31,242	3.90	--
Intermediate	greater than 80% up to and including 100% of the State nonmetropolitan MHI over \$24,994 but <= \$31,242	3.50	1 year
Reduced	less than or equal to 80% of the State nonmetropolitan MHI \$24,994	2.90	2 years

\* Interest rates will remain in effect at least until the proceeds of the currently outstanding revenue bonds have been fully committed

Currently, the State of Indiana is assisting with the financing of dredging Lake Shipshewana in Lagrange County. This project is budgeted for about \$1.5 million and is financed through the Build Indiana Fund. The project's local sponsor is the Lake Shipshewana Community Improvement Association. The LARE program is providing technical oversight of the Shipshewana project and can provide similar assistance to other dredging projects. Because dredging projects are beyond the LARE program's funding capabilities, dredging projects are not funded directly by the LARE program. Without this special source of funding, LARE would not be able to be involved, as dredging projects are beyond their normal financial capabilities.

## **5.5 Easements and Land Availability**

### **5.5.1 Sleepy Hollow Ditch**

Property owners along Sleepy Hollow Ditch were identified from the Monon Railroad to the entrance of Sleepy Hollow Ditch into Cedar Lake. Property owner information was obtained from Hanover Township Office of the Assessor and a 1998 Lake County Plat Book. Five areas are addressed in detail in this feasibility analysis. Areas 1, 1-A, 2, and 3 are shown in Figure 12. Stream bank stabilization, recommended at four main stream reaches, is shown in Figure 11.

Area 1, identified as parcel 005-24-0013-0001, is owned by Indian Oaks Mobile Home Park, Inc., c/o Arthur J. Ferrari, 8100 W. Joliet Road, Peotone, Illinois 60468.

Area 1-A has recently been identified as an area potentially available for development. This area, parcel 30-24-0013-0003, is owned by Louis and Betty Wislocki, 13930 Lauerman, Cedar Lake has approximately 320' of stream running through it.

Area 2 would have the potential to impact the following parcel numbers: 30-24-0019-0006 and 30-24-0019-0033 which are owned by Jovo Radlovic, 14229 Lauerman St., Cedar Lake, Indiana 46303 and Richard Thede, 584 Schooner Lane, Long Boat Key, Florida, 34228.

Area 3, depending on final design, would most likely impact the following parcels: 30-24-0019-0033 which is owned by Mirko Acamovic, 14316 Lauerman, Cedar Lake, Indiana 46303; parcel 30-24-0019-0043 owned by Daniel Harkabus, 14304 Lauerman, Cedar Lake, Indiana 46303; and a section of land around and including the north corner of Cedar Lake Marsh owned by Robert and Nacille Hawkinson.

Stream bank stabilization is studied in four main stream reaches and would potentially impact the following parcels: parcel 005-24-0013-0001 owned by Indian Oaks Mobile Home Park, Inc., c/o Arthur J. Ferrari, 8100 W. Joliet Road, Peotone, Illinois 60468; parcel 30-24-0138-0027 owned by Peter Harvey Hawkinson, 9505 W. 137th Ave., Cedar Lake, Indiana, 46303; 30-24-0013-0004 owned by James and Joan Kennedy, P.O. Box 291, Ironton, Ohio 45638; 30-24-0013-0014 owned by Robert and Polly Kleckner, 13948 Lauerman, Cedar Lake, Indiana, 46303; 30-24-0018-0005 owned by Francis Zurbriggen, 8815 W. 141st Ave., Cedar Lake, Indiana 46303; 30-24-0129-0009 owned by Olen Granger, Jr., 14133 Parrish Ave., Cedar Lake, Indiana 46303; 30-24-0129-0010 owned by Myra Morales, 2117 S. Kenilworth Ave., Berwyn, Illinois 60402; and 30-24-0019-0043 owned by Daniel Harkabus, 14304 Lauerman, Cedar Lake, Indiana 46303.

## **5.5.2 Dredging**

Land ownership is an issue for dredging due to the confined disposal facility (CDF) required for the sedimentation basin. In Harza's feasibility study of the dredging alternatives, six potential CDF sites were identified: A, B, C, D, E<sub>1</sub>, and E<sub>2</sub> (Figure 19). Land use and ownership issues at each of these sites are briefly discussed as follows.

**Site A.** Site A is approximately 300 acres of farm fields which are bound on the south by 141<sup>st</sup> Avenue, on the east by Parrish Avenue, on the west by the New York Central Railroad, and on the north by Sleepy Hollow Ditch. This site gently slopes northeast towards Sleepy Hollow Ditch. The site is planted mostly in corn. Notable features include power lines on the east and west boundaries of this property, New York Central Railroad on the west side, one house in the northeast corner of this site, and an underground telephone cable on the south boundary. This site is owned by two entities, Frank P. Kretz, Jr. and NBD Bank.

**Site B.** Site B is approximately 400 acres of farm fields, bound on the north by 141<sup>st</sup> Avenue, on the east by Parrish Avenue, on the west by the New York Central Railroad, and on the south by a drainage inlet leading into the north part of Cedar Lake Marsh. This site gently slopes to the east, southeast towards Cedar Lake Marsh. Notable features include power lines on the east and west boundaries of the property, and the New York Central Railroad on the west side. There is a small wetland on the extreme west corner of this property. If this site is chosen as a disposal site, care will have to be taken not to fill or impact this wetland. This site is owned by David Hawkinson, Jr. and Francis S. Schreiber.

**Site C.** Site C is approximately 700 acres of farm fields, pastures, and wooded sites which are bound on the east by the Monon Railroad, on the west by Parrish Avenue, on the south by 155<sup>th</sup> Avenue, and on the north by a small stream draining into the north end of Cedar Lake Marsh. The area gently slopes east, southeast toward Cedar Lake Marsh. Notable features include power lines on the east and south boundaries, a few houses on the west and south boundaries, and the Monon Railroad on the east boundary. There is a small wetland in the southeast corner of this site and, if this site is chosen, care will have to be taken not to fill or impact the wetland. To utilize this site as a CDF, piping would most likely cross through Cedar Lake Marsh as this is the most direct route. This site is owned by the following entities: David and Harriet Hawkinson, Kenneth Huseman, Bernard Wornhoff, William Poer, and Steven Micic.

**Site D.** Site D is approximately 275 acres of farm fields which are bound on the west by Morse Street, on the south by 153<sup>rd</sup> Avenue, on the north by Reeder Road, and on the east by Cedar Creek. This area gently slopes to the east (Cedar Creek) and is currently planted in corn and beans. Notable features include power lines on the west boundary, and houses on the southeast boundary. There are wetlands on the east boundary of this site along Cedar Creek. If this site is chosen for disposal, care will have to be taken not to fill or impact the wetlands. A CDF at this site could discharge into either Cedar Lake Marsh or Cedar Creek. This site is owned by Charles F. Roberts and Marilyn Hansen.

**Site E<sub>1</sub> and E<sub>2</sub>.** Sites E<sub>1</sub> and E<sub>2</sub> are approximately 150 acres of farms fields which are bound on the south by 141<sup>st</sup> Avenue, on the west by Parrish Avenue, on the north by Sleepy Hollow Ditch, and on the east by houses along Lauerman Street. These sites gently slopes to the north, northeast towards Sleepy Hollow Ditch and are currently planted in corn and beans. Outlets of tile drains are noted in Sleepy Hollow Ditch in this area. It is assumed that the tile drains serve these sites. Notable features

include power lines on the west and south boundaries, houses on the east and southeast boundaries, and the Monon Railroad which splits these two sites. These sites are owned by P. Harvey Hawkinson and Arthur J. Ferrari.

## **5.6 Unusual Physical and/or Social Costs**

Through the course of public meetings, residents of Cedar Lake expressed concern that recommended solutions provide not only water quality benefits but also aesthetic benefits. The citizens expressed their desires to have something natural that could blend into and/or complement the existing landscape. The public also expressed concern of flooding that is prevalent along Sleepy Hollow Ditch. Concerns were also expressed about discharging additional water and sediments into Cedar Lake Marsh and upsetting its habitat and hydrology. Particular concern was expressed in disturbing areas of the marsh which had become habitat for diverse bird and plant species. Given the environmental awareness of the average Cedar Lake citizen, the diversion of Sleepy Hollow Ditch into Cedar Lake Marsh is unfavorable as it not only upsets marsh habitat and hydrology but the locating of the stream will affect large stands of hardwoods which are habitat for many different species of birds and animals. It is estimated that an area in excess of one acre will be disturbed just to located the stream channel. Also, disturbances to an additional acre of forested and wetland area can be expected from constructing this diversion project.

## **5.7 Bioassessment**

A stream bioassessment was performed on the Sleepy Hollow Ditch to assess the biotic integrity of the stream and potential impacts of lake enhancement alternatives. Measurements of stream flow, water quality parameters and the collection of aquatic macroinvertebrates were performed to assess the streams ecosystem.

### **5.7.1 Background**

Sleepy Hollow Ditch is an intermittent stream which serves as a drainage for the land area west of Cedar Lake. Typical of intermittent streams, the flows in this ditch are greatly affected by surface drainage during periods of precipitation. The ditch experiences periods of no flow during several weeks of the summer, fall and winter, depending upon the level of precipitation. Most reaches of the stream become dry, but some of the deeper pools hold water during the periods of no flow.

Fish are not considered to be a fair assessor of the environmental quality in Sleepy Hollow Ditch because of the periods of no flow. The physical constraints imposed on the stream by intermittent flow does not provide the type of environment suitable to fish populations. Fish will enter the ditch from Cedar Lake and move upstream into upper reaches of the ditch. Fish may also hold over in the deeper pools that remain full of water during the times when there is no flow in the ditch. Both common carp and gizzard shad were observed during the study.

### **5.7.2 Sampling Stations**

Bioassessments were performed at five locations as shown in Figure 20. Station 1 is approximately 200 feet upstream of the Monon railroad crossing. This location was selected because it is upstream of the proposed wetland area. The habitat at the station was very different than the lower reaches of the stream. The stream channel was comparatively narrow and the water was much deeper. There were agricultural fields on both sides with this years crop being corn. Some trees provided overhanging canopy, but instream cover was limited. The streams substrate was mostly sand and some gravel.

Station 2A is also upstream of the proposed wetlands location, and is located at the railroad crossing. This station was selected because there was riprap present from the railroad crossing and this provided for additional habitat for aquatic macroinvertebrates. This station is not indicative of the habitat along Sleepy Hollow Ditch; but, information on the streams character could be gained by the collection of macroinvertebrates from here. The substrate was cobble and boulders, the bridge and some trees provided overhead canopy. The shoreline vegetation was grasses and instream cover was limited to the velocity shelters of the boulders.

Station 2 is within the boundary of the proposed wetland. Both banks were forested and possess underbrush of shrubs and forbes. Surrounding the trees and undergrowth which flank the stream on both sides are agricultural fields of corn. The substrate consisted of hard claypan with silt, sand and gravel overlaying the claypan in areas. The overhead canopy was dense, and the instream cover included fallen trees, debris, and refuse from the upstream railroad crossing (railroad ties, garbage, etc.).

Station 3 is located behind the Hanover Township Assessors Office and is downstream of the proposed wetland location. This area of the stream is bordered by residential properties on one side and agricultural fields of corn on the other. The substrate consisted of cobble and gravel over a hardpan clay. Overhead canopy was provided by surrounding trees but instream cover was limited.

Station 4 is also downstream of the proposed wetland location, but is the closest station to the outlet of Sleepy Hollow Ditch and Cedar Lake. This station was used as the reference location for the streams comparative analysis. There are residential properties on both sides of the stream, however, both banks were buffered by trees and undergrowth. The substrate consisted of sand and gravel. Overhead canopy was provided by the surrounding trees.

### **5.7.3 Procedures**

Water quality parameters were measured in the field on the same days the collection of biota and flow measurements were taken. Dissolved oxygen, temperature, conductivity, and pH were measured. Habitat was characterized during the bioassessment to give insight into differences that may occur in the communities that have colonized different reaches of the stream. Flow measurements were made within the sample stations in an area of uniform depth that was clear of obstructions. The flow measurements were taken with a Marsh McBirney Model 201D portable water flow meter.

In accordance with USEPA's Rapid Bioassessment Protocol II (Plafkin *et al.*, 1989), aquatic macroinvertebrates were collected both qualitatively and quantitatively. Qualitative collection involved sight selection of individuals, selective rock picking of organisms, and CPOM (course particulate organic matter) grabs, large wood, FPOM (fine particulate organic matter), periphyton, and vascular plants. Quantitative analysis involved the use of a Surber sampler placed in riffles or areas of fast current.

#### 5.7.4 Results

Water quality parameters are tabulated below (Table 5-12). Dissolved oxygen levels for Sleepy Hollow Ditch are very low and less than Indiana water quality standards. Results of flow measurements during the bioassessment study are listed in Table 5-13.

**Table 5-12**

#### **WATER QUALITY PARAMETERS**

Station	Date	Air Temp (°C)	Water Temp (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (μmhos)
St 1	8/7/98	24	23	6.5	4.0	260
St 2	8/7/98	23	23	6.5	3.0	250
St 3	8/6/98	28.5	24	6.7	4.7	270
St 4	8/6/98	29	23	6.8	6.6	270

**Table 5-13**

#### **STREAM FLOW MEASUREMENTS**

Station	Date	Stream Width (ft)	Max Depth (ft)	Total Discharge (cfs)
St 1	8/7/98	3.6	1.2	2.1
St 2	8/7/98	3.9	0.8	1.8
St 3	8/6/98	4.4	0.8	3.3
St 4	8/6/98	7.5	0.6	3.3

Metrics evaluating the macroinvertebrate communities at all stations are given in Table 5-14 in the format of the USEPA's Rapid Bioassessment Protocol II - Benthic Macroinvertebrates. Metric 1, Taxa Richness, reflects the health of the community through a measurement of the variety of taxa



present. Generally this value increases with an increase in water quality, habitat diversity, and habitat suitability. Metric 2, Modified Family Biotic Index, tolerance values range from 0 to 10 for families and increase as water quality decreases. Metric 3, Scraper to Filtering Collector Ratio, reflects the riffle/run community foodbase. Metric 4, EPT to Chironomidae Ratio, measures the community balance between Ephemeroptera, Plecoptera, Trichoptera and Chironomidae. Good biotic condition is reflected in communities with an even distribution among all four major groups and substantial representation in the sensitive groups (EPT). Metric 5, Percent Contribution of Dominant Family, uses the abundance of the numerically dominant taxon relative to the total number of organisms as an indication of community balance at the family-level. Metric 6, EPT Index, is the total number of distinct taxa within the groups Ephemeroptera, Plecoptera and Trichoptera. This value generally increases with the increase in water quality. Metric 7, Community Similarity Indices, measures the loss of benthic taxa between a reference station and the station of comparison. Metric 8, Shredder to Total Individuals Collected Ratio, the abundance of the Shredder Functional Group relative to the abundance of all other Functional Groups allows evaluation of potential impairment as indicated by the Course Particulate Organic Matter-based Shredder community. Shredders are sensitive to riparian zone impacts and are particularly good indicators of toxic effects when the toxicants involved are readily adsorbed to the CPOM and either affect microbial communities colonizing the CPOM or the Shredders directly.

The Biological Condition Category, a comparison to the reference station, rates all of the sampled stations as unimpaired reaches of the stream. However, as typical of intermittent streams, the aquatic macroinvertebrate populations are affected by the physical limitations of periods of little or no flow. All of the stations, with the exception of Station 1, did not have any Ephemeropterans, Plecopterans or Trichopterans. This also demonstrates the harsh living conditions typical of intermittent streams. The greater depth of Station 1 provides pools that enable invertebrates to hold over during periods of no flow, which is likely why one Trichoptera, one Odonata and one Decapoda were collected here.

**Table 5-14**

**BIOASSESSMENT METRICS**

	Station Designation				
	St 1	St 2A	St 2	St 3	St 4
Date	8/7/98	8/7/98	8/6/98	8/6/98	8/6/98
M1 - Species Richness	14	8	9	9	11
M2 - HBI (modified)	6.80	7.96	7.69	7.60	7.15
M3 - Scrapers/Filter Collectors	20/41	15/0	25/0	3/1	20/0

	Station Designation				
	St 1	St 2A	St 2	St 3	St 4
M4 - EPT/Chironomidae	1/20	0/5	0/20	0/28	0/37
M5 - Percent of Dominant Taxon	40/122	80/141	25/131	40/109	30/104
M6 - EPT Index	1	0	0	0	0
M7 - Similarity Index	0.25	0.50	0.33	0.33	0
M8 - CPOM Shredders/Total	18/122	95/141	45/131	31/109	4/104
Biological Condition Category	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Reference

### 5.7.5 Conclusion

The Sleepy Hollow Ditch is a typical intermittent stream that does not possess unique macroinvertebrate communities or critical habitat that will be lost if the proposed wetland is placed along it. Constructed wetlands would have little adverse effects on upstream or downstream reaches of this stream.

### 5.8 Soil Borings

Soil borings in the proposed wetland and alum treatment basin were performed with a stainless steel hand auger. Soil borings were selected in the wetland area to assess near stream soils and soils that were in the uplands on the fringe of the stream floodplain. Soils near the stream generally consisted of six inches of black topsoil underlaid by a clay pan with some trace gravel. Generally as depth approached 18 inches, the soil was predominantly hard silty clay with very little gravel. Upland soils were similar in structure to the lowland soils.

In-lake soil structure was assessed in the vicinity of the proposed location for the alum settling basin. In general the soils are classified as a few inches of sand followed by hard silty clay in the nearshore region (0-4') and varying depths of black organic silt overlaying hard silty clay at deeper depths.

### 5.9 Costs

Costs estimates for the alternative lake enhancement projects are provided in Tables 5-15 through 5-22. These tables provide preliminary estimates of cost for development, and include a reasonable level of contingency. All excavation prices assume a disposal site within one mile of removal.

**Table 5-15**

**OPTION 1: ESTIMATED CONSTRUCTION COSTS OF  
WETLAND TREATMENT SYSTEM ON SLEEPY HOLLOW DITCH - AREA 1**

<b>Item</b>	<b>Quantity</b>	<b>Unit Measure</b>	<b>Unit Cost</b>	<b>Item Cost</b>
<b><i>Construction</i></b>				
Check Dam	300	Cubic yards	\$15	\$4,500
Dam Excavation	175	Cubic yards	\$10	\$1,750
Storage Pool Excavation	5,400	Cubic yards	\$7	\$37,800
Landscape Restoration	3	Acres	\$2,000	\$6,000
Mobilization/Demobilization		L.S.	@10%	\$5,000
Contingency/ Undeveloped Detail		L.S.	@30%	\$16,500
<b>Construction Total</b>				<b>\$71,500</b>

Costs do not include land purchase costs, permitting costs, or surveying costs.

**Table 5-16**  
**OPTION 1-A: ESTIMATED CONSTRUCTION COSTS OF**  
**WETLAND TREATMENT SYSTEM ON SLEEPY HOLLOW DITCH - AREA 1-A**

<b>Item</b>	<b>Quantity</b>	<b>Unit Measure</b>	<b>Unit Cost</b>	<b>Item Cost</b>
<i><b>Construction</b></i>				
Check Dam	100	Cubic yards	\$15	\$1,500
Dam Excavation	175	Cubic yards	\$7	\$1,225
Runoff Storage Excavation	3,000	Cubic yards	\$10	\$30,000
Restoration	1	Acres	\$2,000	\$2,000
Tree Removal	5	each	\$500	\$2,500
Mobilization		L.S.	@10%	\$3,800
Contingency/Undeveloped Detail		L.S.	@30	\$12,300
<b>Construction Total</b>				<b>\$53,500</b>

Costs do not include land purchase costs, permitting costs, or surveying costs.

**Table 5-17**  
**OPTION 2: ESTIMATED CONSTRUCTION COSTS OF**  
**ALUM TREATMENT BASIN ON SLEEPY HOLLOW DITCH - AREA 2**

<b>Item</b>	<b>Quantity</b>	<b>Unit Measure</b>	<b>Unit Cost</b>	<b>Item Cost</b>
<i><b>Construction</b></i>				
Check Dam	2,700	Cubic yards	\$25	\$67,500
Dam Excavation	2,175	Cubic yards	\$15	\$32,625
Alum Dosing Equipment	1	Unit	\$75,000	\$75,000
Restoration	1	Acres	\$2,000	\$2,000
Mobilization		L.S.	@10%	\$18,000
Contingency/Undeveloped Detail		L.S.	@30%	\$58,500
<b>Construction Total</b>				<b>\$253,500</b>

Costs do not include land purchase costs, permitting costs, or surveying costs.

**Table 5-18**  
**OPTION 3: ESTIMATED CONSTRUCTION COSTS OF DIVERSION**  
**OF SLEEPY HOLLOW DITCH INTO CEDAR LAKE MARSH - AREA 3**

<b>Item</b>	<b>Quantity</b>	<b>Unit Measure</b>	<b>Unit Cost</b>	<b>Item Cost</b>
<i><b>Construction</b></i>				
Channel Excavation	8,500	cubic yards	\$10	\$85,000
Tree Removal	25	each	\$500	\$12,500
Mobilization		L.S.	@10%	\$9,750
Contingency/ Undeveloped Detail		L.S.	@30%	\$32,200
<b>Construction Total</b>				<b>\$139,500</b>

Costs do not include land purchase costs, permitting costs, or surveying costs.

**Table 5-19**  
**OPTION 4: ESTIMATED CONSTRUCTION COSTS OF**  
**STREAMBANK EROSION PROTECTION**

Item	Quantity	Unit Measure	Unit Cost	Item Cost
<i>Construction</i>				
Erosion Protection	800	feet	\$60	\$48,000
Mobilization		L.S.	@10%	\$4,800
Contingency/Undeveloped Detail		L.S.	@30%	\$16,000
Construction Sub Total				\$66,000
<b>Grand Total Design and Construction</b>				<b>\$68,800</b>

Costs do not include land purchase costs, permitting costs, or surveying costs.

**Table 5-20**

**OPTION 5A: ESTIMATED COSTS OF LAKE DREDGING-CASE I**

<b>Description</b>	<b>Estimate</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
Mobilization	-	L.S.	-	\$202,500
Clearing , Grubbing, and Striping	44,000	Yd <sup>3</sup>	\$1.90	\$83,600
Common Excavation	66,930	Yd <sup>3</sup>	\$1.42	\$95,041
Earthfill	46,115	Yd <sup>3</sup>	\$1.01	\$46,576
Impervious Fill	12,305	Yd <sup>3</sup>	\$3.50	\$43,068
Rip-rap	1,290	Tons	\$34	\$43,860
Rip-rap embedded in Concrete (Grounted Rip-rap)	690	Tons	\$54	\$37,260
Filter Fabric	720	Yd <sup>2</sup>	\$6.75	\$4,860
Rockfill	900	Yd <sup>3</sup>	\$27	\$24,300
Bedding Material	12	Yd <sup>3</sup>	\$20.25	\$243
Reinforced Concrete	150	Feet	\$135	\$20,250
Corrugated Steel Culvert	320	Feet	\$40.50	\$12,960
Cast in Place Concrete, including Formwork, Accessories	-	L.S.	-	\$34,000
Topsoil, Min. 8" Thick	33,700	Yd <sup>2</sup>	\$0.69	\$23,253
Seeding and Fertilizing	2,600	Pounds	\$1.35	\$3,510
Mulching	10	Acres	\$1,350	\$13,500
Miscellaneous Metal including Handrails, Trash racks, etc.	-	L.S.	-	\$6,750
Floating Skimmer	-	L.S.	-	\$3,240
Sluice Gate	-	L.S.	-	\$4,050
Plugging Existing Drain Tiles	10	Each	\$675	\$6,750
Reclamation Plan	-	L.S.	-	\$14,400
Dredging Cedar Lake	130,000	Yd <sup>3</sup>	\$4.83	\$627,900
Security Fence	5,400	Feet	\$12.83	\$69,282
Double Swing Gates	4	Each	\$810	\$3,240
Dewatering	-	L.S.	-	\$30,800
Subtotal				\$1,455,192
Contingency @ 15%				\$218,279
Surveying/Engineering/Administration @ 22%				\$320,142
<b>Subtotal (Construction and Engineering)</b>				<b>\$1,993,613</b>
Land Leasing Costs: 35 acres for 2 years @\$150/acre/year				\$10,500



Description	Estimate	Unit	Unit Price	Total
Total				\$2,004,113

**Table 5-21**

**OPTION 5B: ESTIMATED COSTS OF LAKE DREDGING-CASE II**

<b>Description</b>	<b>Estimate</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
Mobilization	-	L.S.	-	\$283,500
Clearing , Grubbing, and Striping	100,000	Yd <sup>3</sup>	\$1.9	\$190,000
Common Excavation	147,828	Yd <sup>3</sup>	\$1.42	\$209,916
Earthfill	104,260	Yd <sup>3</sup>	\$1	\$104,260
Impervious Fill	27,820	Yd <sup>3</sup>	\$3.5	\$97,370
Rip-rap	1,720	Tons	\$34	\$58,480
Rip-rap embedded in Concrete (Grouted Rip-rap)	920	Tons	\$54	\$49,680
Filter Fabric	960	Yd <sup>2</sup>	\$6.75	\$6,480
Rockfill	1,200	Yd <sup>3</sup>	\$27	\$32,400
Bedding Material	12	Yd <sup>3</sup>	\$20.25	\$243
Reinforced Concrete	150	Feet	\$135	\$20,250
Corrugated Steel Culvert	320	Feet	\$40.5	\$12,960
Cast in Place Concrete, including Formwork, Accessories	-	L.S.	-	\$37,800
Topsoil, Min. 8" Thick	62,345	Yd <sup>2</sup>	\$0.69	\$43,018
Seeding and Fertilizing	5,200	Pounds	\$1.35	\$7,020
Mulching	20	Acres	\$1,350	\$27,000
Miscellaneous Metal including Handrails, Trash racks, etc.	-	L.S.	-	\$6,750
Floating Skimmer	-	L.S.	-	\$3,240
Sluice Gate	-	L.S.	-	\$4,050
Plugging Existing Drain Tiles	10	Each	\$675	\$6,750
Reclamation Plan	-	L.S.	-	\$20,200
Dredging Cedar Lake	670,000	Yd <sup>3</sup>	\$4.83	\$3,236,100
Security Fence	7,965	Feet	\$12.83	\$102,191
Double Swing Gates	4	Each	\$810	\$3,240
Dewatering	-	L.S.	-	\$57,500
Subtotal				\$4,620,398
Contingency @ 15%				\$693,060
Surveying/Engineering/Administration @ 15%				\$693,060
<b>Subtotal (Construction and Engineering)</b>				<b>\$6,006,517</b>
Land Leasing Costs: 80 acres for 2 years @\$150/acre/year				\$24,000

Description	Estimate	Unit	Unit Price	Total
Total				\$6,030,517

Table 5-22

## OPTION 5C: ESTIMATED COSTS OF LAKE DREDGING-CASE III

Description	Estimate	Unit	Unit Price	Total
Mobilization	-	L.S.	-	\$353,500
Clearing , Grubbing, and Striping	135,000	Yd <sup>3</sup>	\$1.9	\$256,500
Common Excavation	195,000	Yd <sup>3</sup>	\$1.42	\$276,900
Earthfill	135,000	Yd <sup>3</sup>	\$1	\$135,000
Impervious Fill	38,000	Yd <sup>3</sup>	\$3.5	\$133,000
Rip-rap	1,980	Tons	\$34	\$67,320
Rip-rap embedded in Concrete	1,300	Tons	\$54	\$70,200
Filter Fabric	1,200	Yd <sup>2</sup>	\$6.75	\$8,100
Rockfill	1,500	Yd <sup>3</sup>	\$27	\$40,500
Bedding Material	13	Yd <sup>3</sup>	\$20.25	\$263
Reinforced Concrete	180	Feet	\$135	\$24,300
Corrugated Steel Culvert	350	Feet	\$40.5	\$14,175
Cast in Place Concrete, including Formwork, Accessories	-	L.S.	-	\$37,800
Topsoil, Min. 8" Thick	70,900	Yd <sup>2</sup>	\$0.69	\$48,921
Seeding and Fertilizing	6,900	Pounds	\$1.35	\$9,315
Mulching	23	Acres	\$1,350	\$31,050
Miscellaneous Metal including Handrails, Trash racks, etc.	-	L.S.	-	\$6,750
Floating Skimmer	-	L.S.	-	\$3,500
Sluice Gate	-	L.S.	-	\$4,050
Plugging Existing Drain Tiles	10	Each	\$675	\$6,750
Reclamation Plan	-	L.S.	-	\$20,200
Dredging Cedar Lake	1,100,000	Yd <sup>3</sup>	\$4.83	\$5,313,000
Security Fence	12,000	Feet	\$12.83	\$153,960
Double Swing Gates	4	Each	\$875	\$3,500
Dewatering	-	L.S.	-	\$70,000
Subtotal				\$7,088,554
Contingency @ 15%				\$1,063,283
Surveying/Engineering/Administration @ 15%				\$1,063,283
<b>Subtotal (Construction and Engineering)</b>				<b>\$9,215,121</b>
Land Leasing Costs: 100 acres for 3 years @\$150/acre/year				\$45,000
<b>Total</b>				<b>\$9,260,121</b>

## 5.10 Recommendations

Feasibility analysis indicates that a wetland treatment system, alum treatment basin, diversion of Sleepy Hollow Ditch and/or bank erosion protection along Sleepy Hollow Ditch can:

- provide minimal levels of reduction in peak flood flows and levels in Sleepy Hollow Ditch downstream of the Monon line
- reduce sediment and nutrient loading into Cedar Lake
- reduce floodplain loss from stream bank erosion and resulting stream widening

A summary of all options studied is presented in Table 5-23. Two options for development in the Sleepy Hollow subbasin are recommended. First, a wetland treatment basin is recommended to be designed and constructed in Area A (Figure 13). This system will provide for significant removal of sediment and associated pollutants from upstream areas. Wetland treatment systems also provide wildlife habitat and aesthetic values to Sleepy Hollow Ditch. Although Option 1-A is also a viable location, its smaller size would provide less benefit and have higher operation and maintenance costs associated with periodic cleaning. It is also recommended that stream banks downstream of the wetland basin be stabilized (Option 4). The combined construction cost of these two measures is about \$140,500 and will constitute measurable reductions in non-point source pollution from the Sleepy Hollow watershed. Mean annual total phosphorus concentrations in the lake will be reduced by about ten percent.

To finance these two recommended Sleepy Hollow projects, the two most promising sources are the LARE Program and the SRF. We recommend that the CLEA apply to the "T by 2000" program for design and implementation assistance for construction of this wetland stormwater treatment system. If LARE is unable to finance the projects, then the State Revolving Fund, administered by IDEM Office of Water Management, can be approached when ongoing policy revisions permit financing of watershed management projects.

Recent sediment *Escherichia coli* data showed the presence of high *Escherichia coli* levels in the beach area. We recommend that the CLEA assess the source(s) and cause(s) of these bacteria and, depending upon the results of that study, explore ways to improve water quality from the inlet at the north end of Cedar Lake near the condominiums. This storm sewer drain serves a small watershed, but reports of sediment plumes and now positive *Escherichia coli* results suggests that water quality should be improved before being discharged into Cedar Lake. This area is popular as a swimming area for the condominium residents and given the impaired water quality, this area should be tested as part of the *Escherichia coli* water monitoring effort periodically performed on Cedar Lake.

In addition, dredging Cedar Lake is feasible and will have significant water quality benefits. If the lake enhancement goal is to reduce nutrient loadings by 50% within the next five years, then we recommend that the lake be dredged (Option 5C). This has significant costs and the CLEA will require external funding to

implement a dredging project.

Given that a large percentage of the lake's watershed is devoted to agriculture and golf courses, Best Management Practices (BMPs) should be encouraged and implemented on a watershed wide basis. Agricultural land management schemes or BMPs are very important lake management tools in rural watershed. Golf courses are notorious non-point sources of nutrients and pesticides. Examples of BMPs include contour farming, nutrient management, strip cropping, terracing, low till and no-till farming, grassed waterways, and integrated pest management. BMPs should generally be selected on a field by field or development by development basis, at a level of detail beyond the scope of this particular watershed study. Technical and financial assistance to implement BMPs is available from the County Soil and Water Conservation District and watershed residents are strongly encourage to utilize these programs and to seek assistance with their implementation. Appendix 5 provides a summary table followed by in-depth information and contacts on select programs which provide financial and/or technical assistance for potential watershed and lake enhancement projects.

**Table 5-23**

**SUMMARY TABLE**

	Wetland Option 1	Wetland Option 1-A	Alum Treatment Option 2	Ditch Diversion Option 3	Bank Stabilization Option 4	Dredging Option 5A	Dredging Option 5B	Dredging Option 5C
Capital Costs	\$71,500	\$53,500	\$253,500	\$139,500	\$68,800	\$2,004,000	\$5,707,000	\$9.3 million
Lake Response (Baseline = 0.23 mg/L)	0.22 mg/L	0.22 mg/L	0.20 mg/L	0.22 mg/L	0.23 mg/L	0.17 mg/L	0.15 mg/L	0.13 mg/L
Number of Permits	5	5	4	4	5	5	5	5
No. Affected Landowners	1	1	2	3	8	Depends upon CDF	Depends upon CDF	Depends upon CDF
Environmental Concerns	Minor	Minor	Al toxicity	Loss of mature trees; hydrologic changes in marsh	No	CDF reclamation; water quality	CDF reclamation; water quality	CDF reclamation; water quality
Unusual Social Costs	None	None	None	None	None	Drainage tiles	Drainage tiles	Drainage tiles
Flooding Concerns	None; Ponded water	None; Ponded water	None	None	None	None	None	None

## 6.0 ACTION PLAN AND SCHEDULE

Overall the implementation of the Sleepy Hollow Ditch wetland project will have several step-wise components:

- The application for design grants should be prepared and submitted to the LARE office in order to meet the January 1999 design grant phase.
- Upon approval of the design grant (July 1999), field investigations and related analyses should be quickly performed. These efforts are needed to determine final design considerations including soils, surveying, and hydraulic impacts. This information is also needed to facilitate approval of permits. Materials compiled in this stage of effort should be used to make submittals to permitting agencies.
- A key element of implementation involves property owner coordination. Agreements must be reached among the individual property owner(s) before any improvements can be implemented.
- The last element of the implementation action plan is design of the sediment and nutrient control facilities. This effort will focus on the design and the preparation of bid documents for the project.
- Following completion of the project design documents and the bid tendering, the project will be constructed.

The implement steps may vary slightly from the schedule described above depending on local decisions related to the configuration of the facilities, permitting issues, or other factors. The following tasks are recommended:

1. Property Owner(s) Coordination (July 1999). Acceptance of the proposed plan by affected property owner(s) will be critically important to successful and timely project implementation. Using the concepts in this study, the CLEA should continue discussions with property owners in the project area. These discussions should focus on the likely timing of developments and the need for individual owners to commit land area to the project. Results of these discussions will directly impact the final configuration of the proposed improvement.
2. Detailed Hydraulic Analysis/Flow Monitoring (Fall and Winter 1999). Analyses conducted for this study indicate that there is no FIS data for Sleepy Hollow Ditch. Permitting agencies will potentially require that analyses be conducted to clearly demonstrate how the proposed improvements will function during a range of possible storm events. Therefore, it is recommended that additional detailed hydrologic and hydraulic modeling of the Sleepy Hollow Ditch watershed be performed. This modeling effort will provide the basis for obtaining critical water resources permits from the IDNR. Key elements of the modeling task will include refining of the hydrologic



model of the watershed upstream of the project site based on designed inlet and outlet sizes and controls.

3. Subsurface Investigations (Fall 1999). Subsurface conditions at the project site have the potential to significantly impact the design and layout of the proposed project. Therefore, it is recommended that a program of borings and piezometers be used to characterize the subsurface profile and assess normal groundwater levels. Soil borings will be needed to determine the types and extent of sub-surface soils present at the site of any proposed improvements. The borings should be logged, and soil samples should be collected at 2.5 foot intervals using a split spoon sampler. The drilled holes, upon completion, should be grouted with a bentonite-cement grout. Soil samples should be selectively analyzed for parameters such as: visual soil classification, moisture content, gradation, Atterberg limits, unconfined compressive strength/in situ density, permeability test, and compaction test. Piezometers constructed of 2-inch diameter PVC pipe should be installed and periodically monitored to provide a means for observing of groundwater fluctuations in the overburden at the site. The results of the piezometer installations will provide the data needed to reliably address issues including: subsurface permeability/system linear requirements, excavation and material handling requirements, groundwater levels and fluctuations/impacts on system recharge, and soil structural characteristics (bearing capacity).
4. Detailed Design of Improvements (Winter/Spring 2000). In order for the construction of the proposed improvements to be completed during 2000, detailed design documents for the project will have to be completed during the winter and early spring in parallel with permitting efforts. Critical design plans to be prepared include drawings for the berm, grading and excavation plans for the storage basin, and site restoration plans. Details related to sensitive areas and provisions for effective erosion and sediment control measures will also be required. A detailed site survey will be required to develop accurate topography for the design and to establish appropriate control points for the construction effort.

**Table 6-1**

**ESTIMATED DESIGN AND CONSTRUCTION SCHEDULE OF  
WETLAND TREATMENT SYSTEM ON SLEEPY HOLLOW DITCH**

**Design Phase**

LARE Grants Awarded	July 1999
Detailed Design and Engineering	July 1999 - April 2000
Surveying	August 1999
Geotechnical Sampling and Analysis	August 1999

## **Construction Phase**

Land Aquisition	July 1999 - January 2000
Mobilization	April 2000
Runoff Storage Excavation	April 2000
Dam Excavation	May 2000
Check Dam Construction	May 2000
Landscape Preparation	June 2000

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# FIGURES

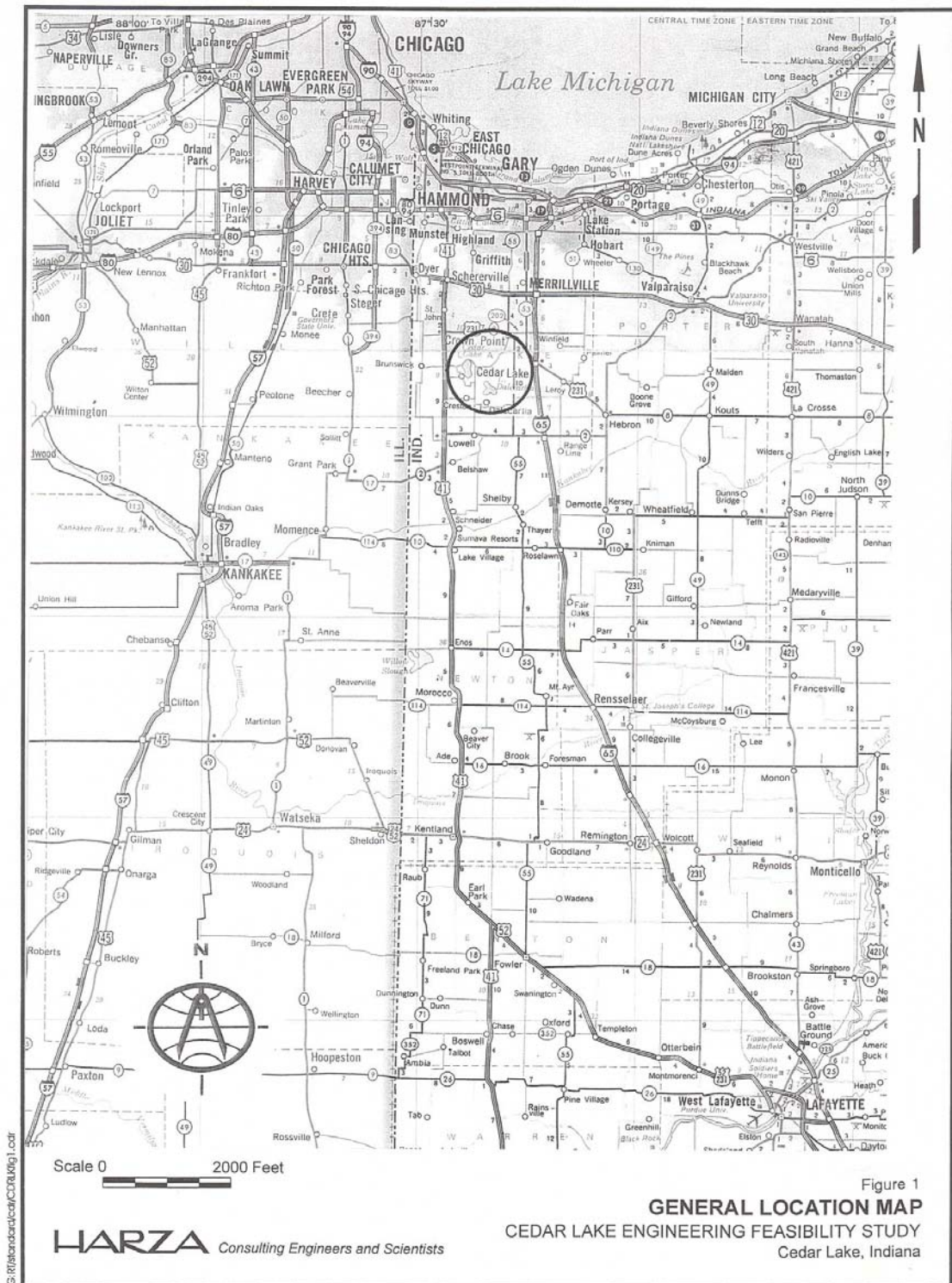


Figure 1  
GENERAL LOCATION MAP

CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
Cedar Lake, Indiana

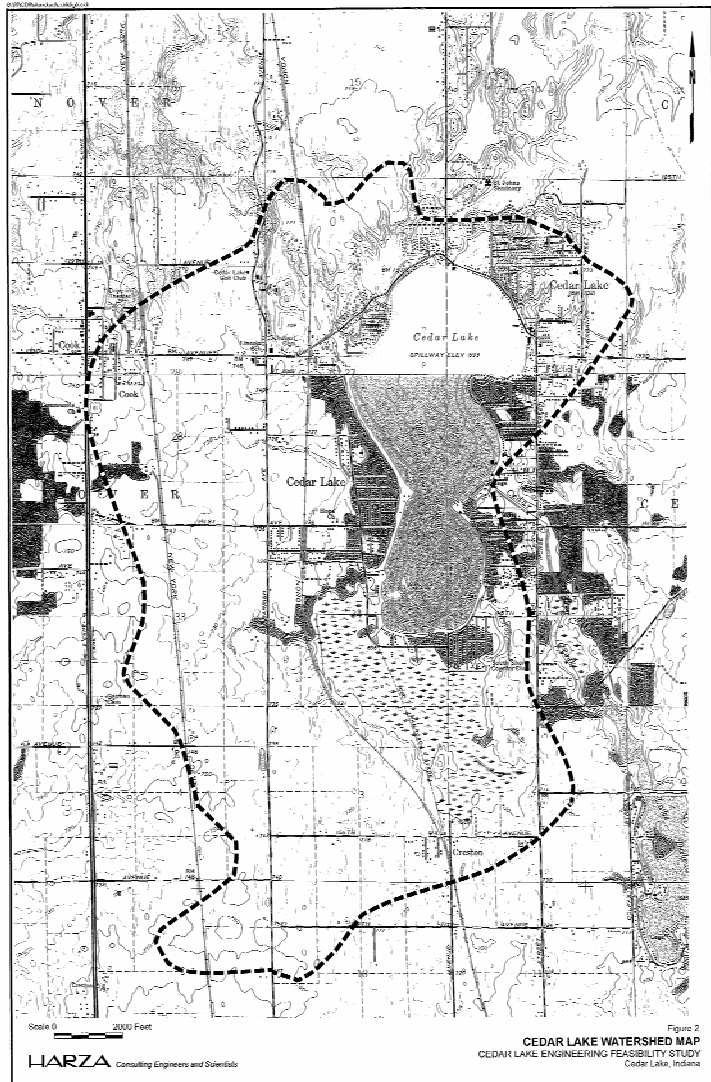


Figure 2

**CEDAR LAKE WATERSHED MAP**  
**CEDAR LAKE ENGINEERING FEASIBILITY STUDY**  
 Cedar Lake, Indiana









Figure 5  
SEDIMENT AND *Escherichia Coli*  
SAMPLE LOCATION MAP  
AKF ENGINEERING FEASIBILITY STUDY  
Cedar Lake, Indiana

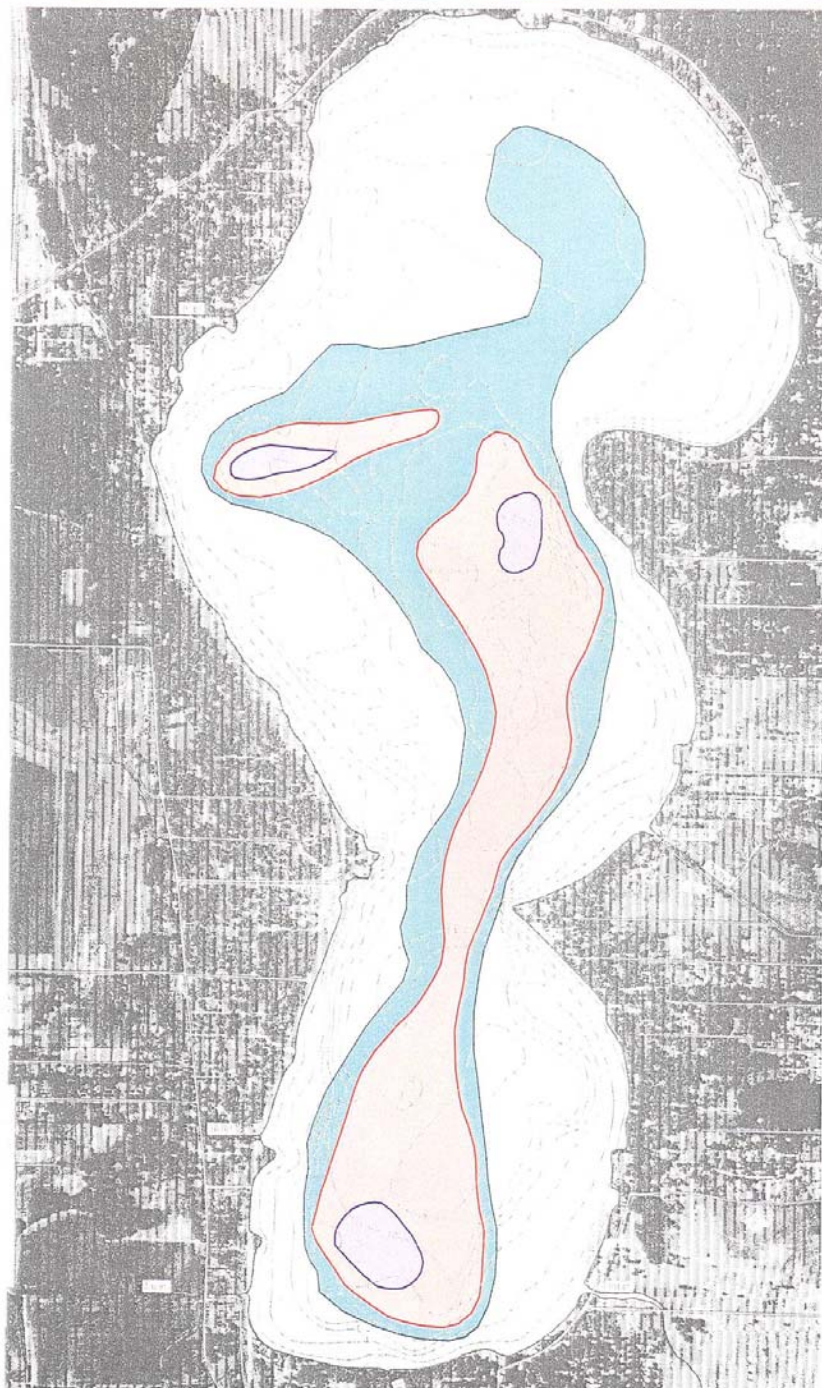


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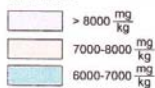


Scale 0 500 1000 1500 Feet  
Approximate Scale



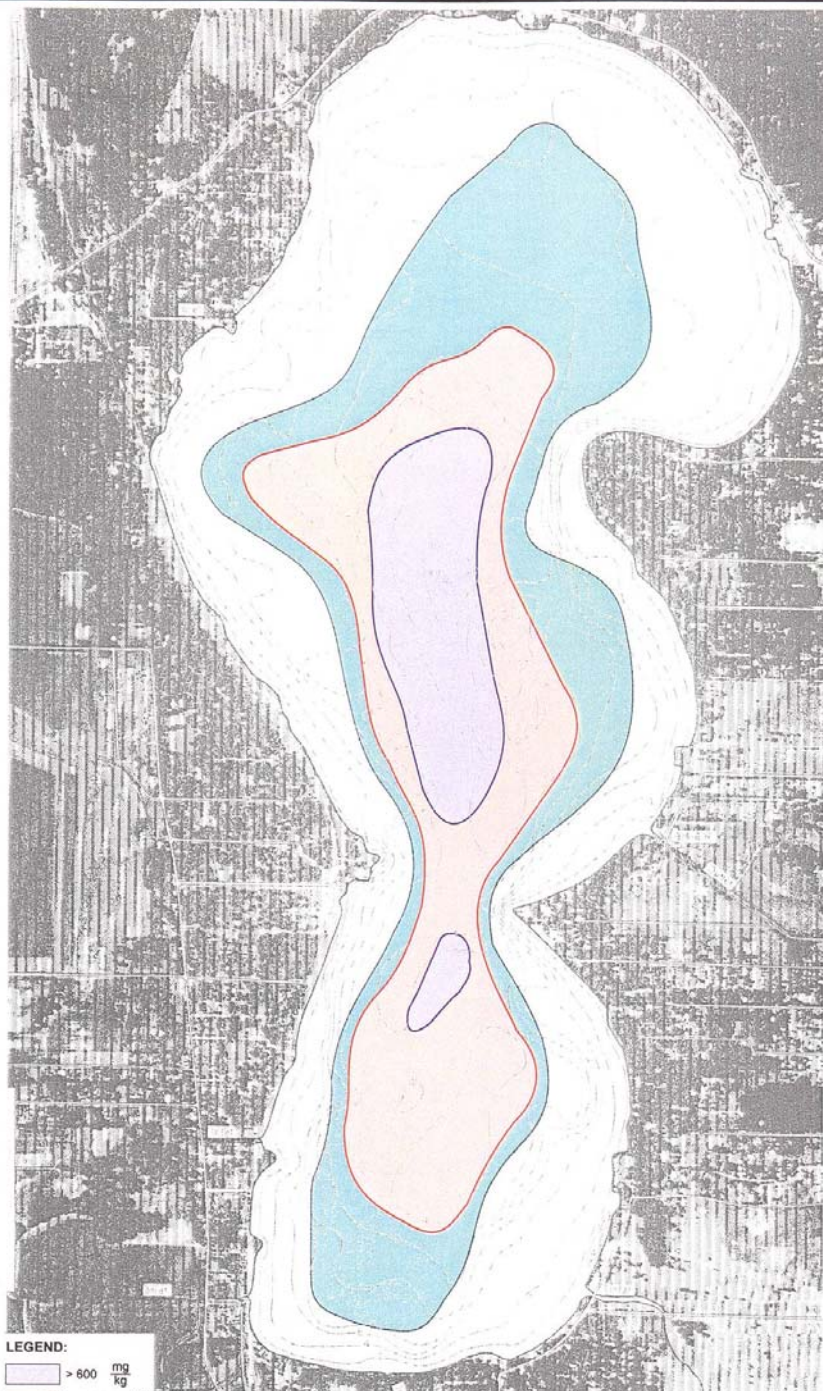


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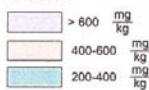


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Figure 7  
**TOTAL KJELDHAL NITROGEN (TKN) ISOPLETH MAP**  
 CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
 Cedar Lake, Indiana



LEGEND:



Scale 0 500 1000 1500 Feet

Figure 8  
**AMMONIA NITROGEN ISOPLETH MAP**  
CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
Cedar Lake, Indiana





**LEGEND:**



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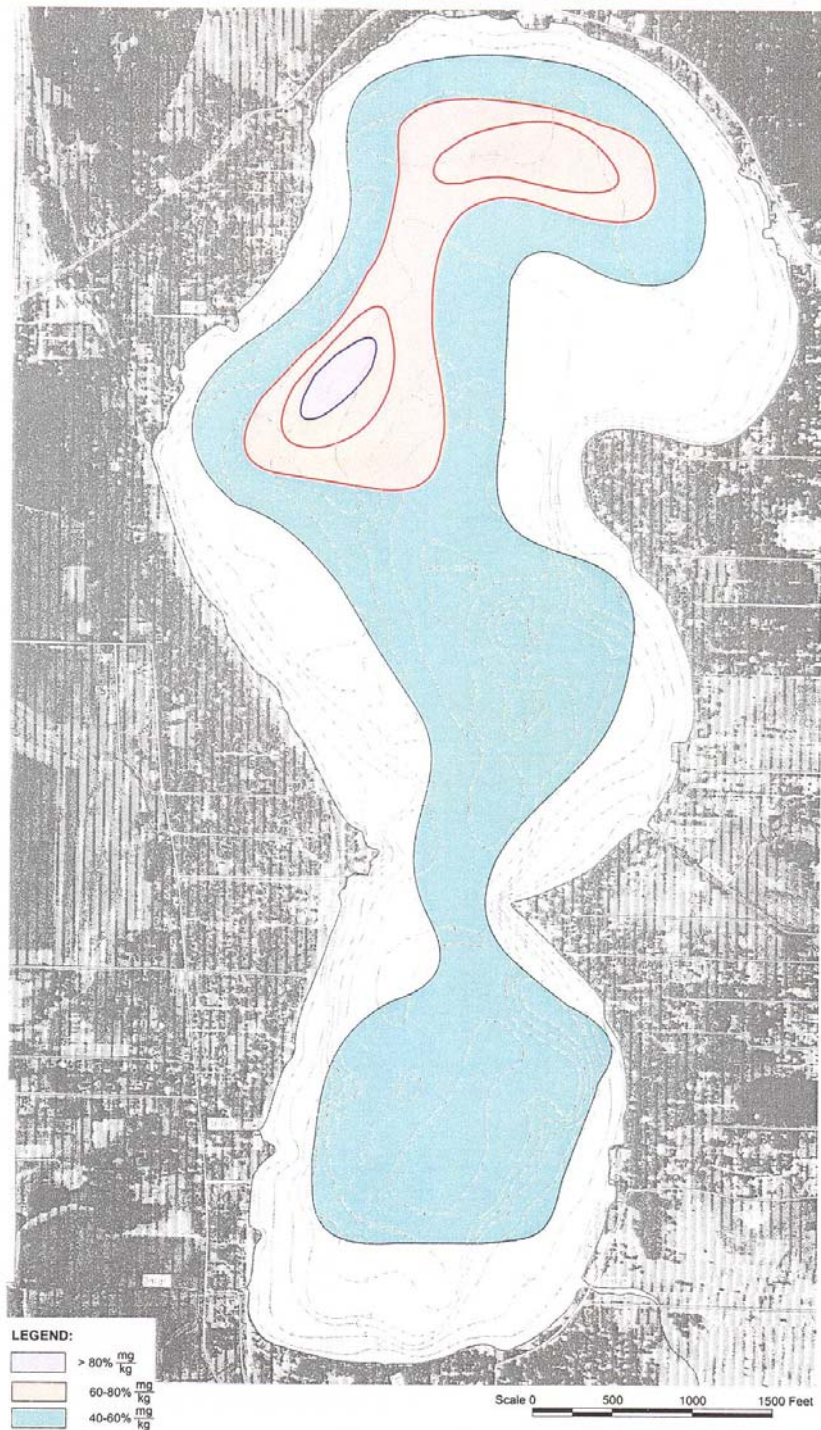


Figure 10  
**PERCENT FINES ISOPLETH MAP**  
 CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
 Cedar Lake, Indiana





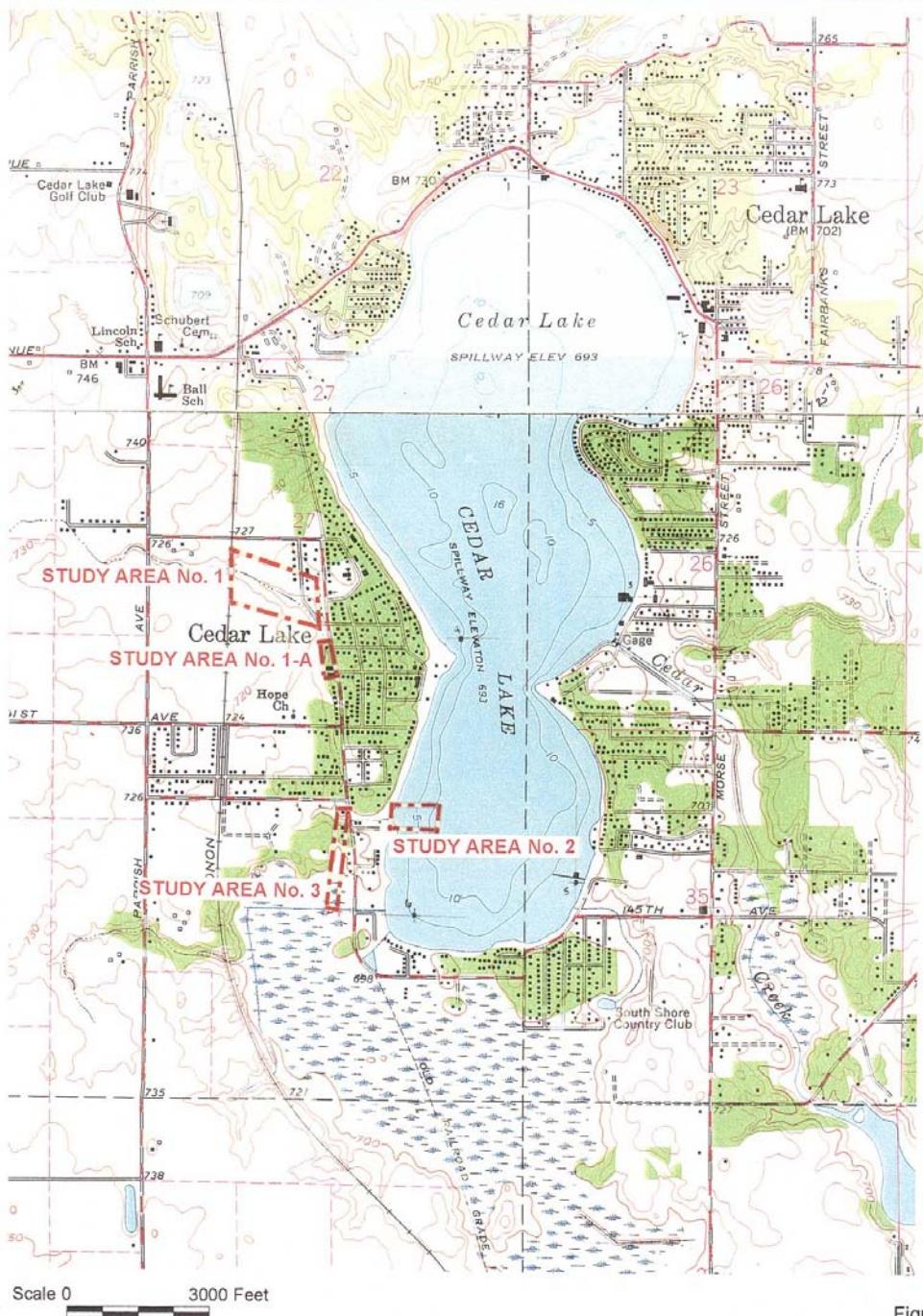


Figure 12  
**STUDY LOCATION MAP**  
 CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
 Cedar Lake, Indiana

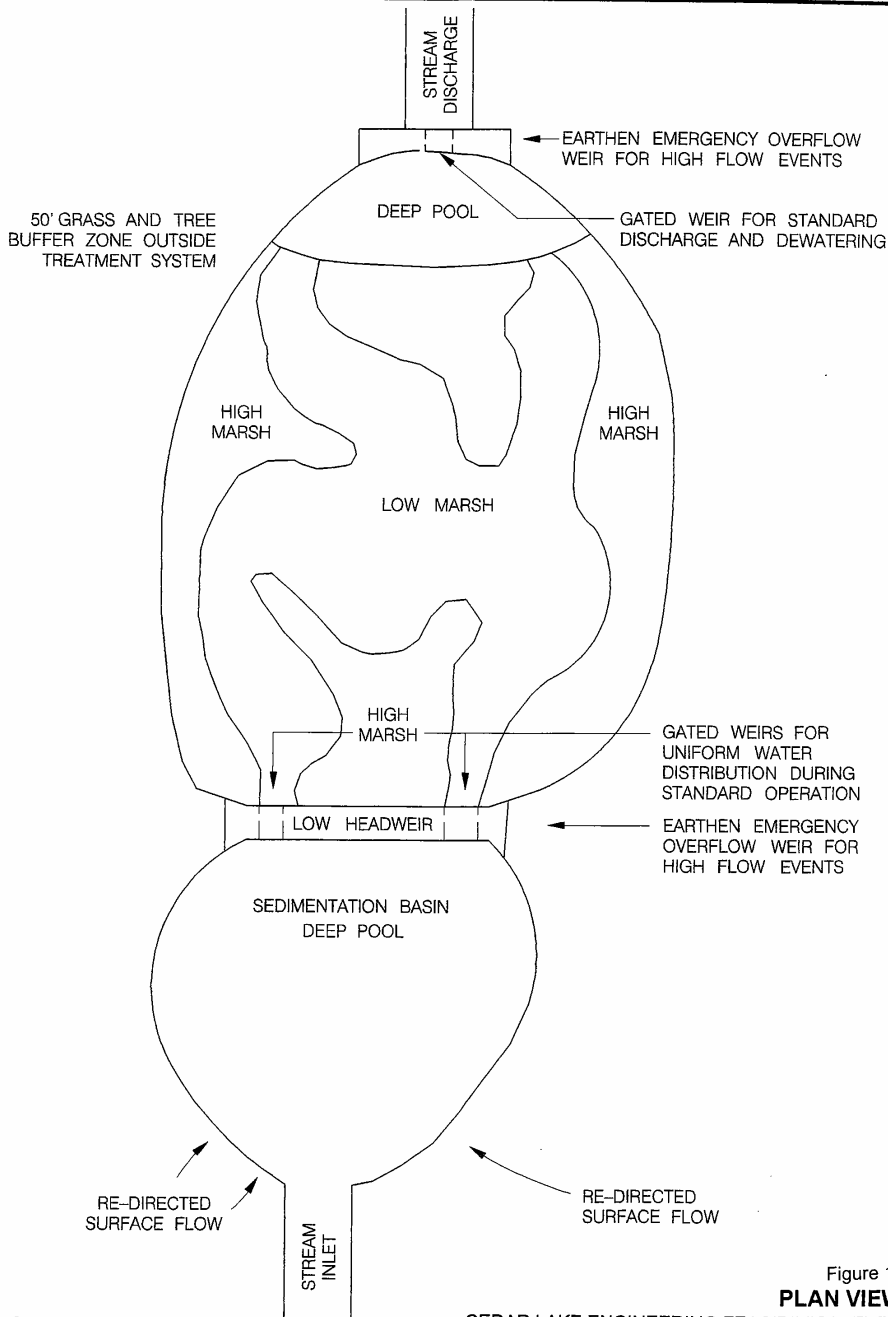
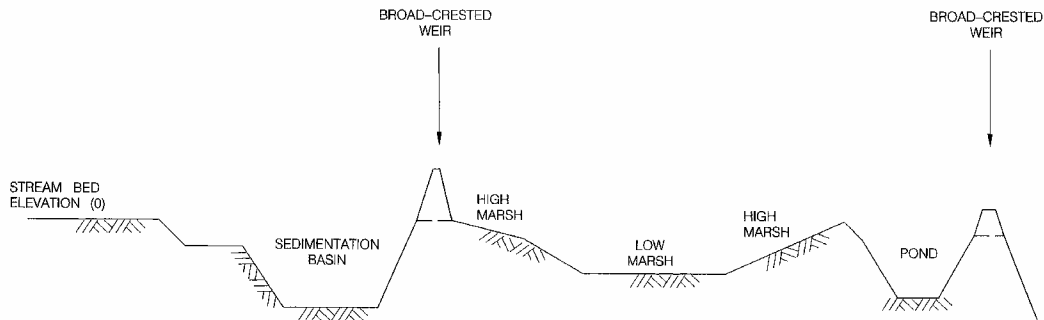


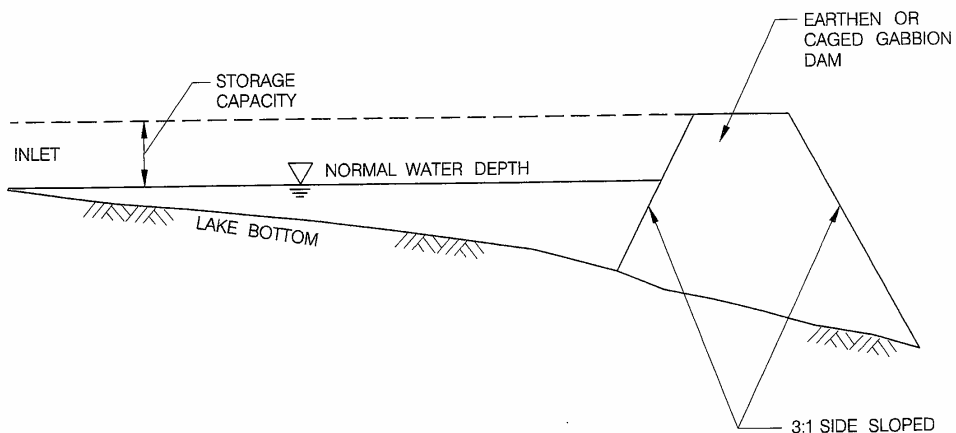
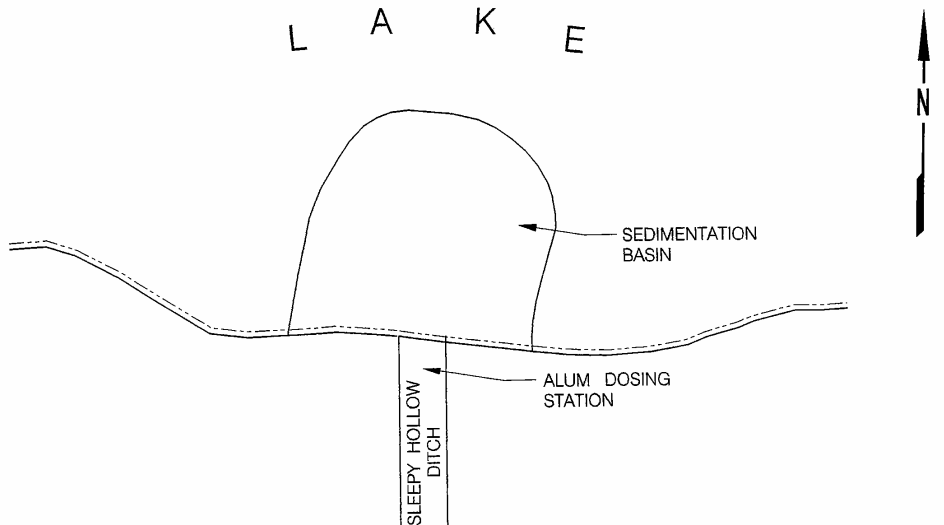
Figure 13  
PLAN VIEW

CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
Cedar Lake, Indiana



**CONCEPTUAL WETLANDS TREATMENT SYSTEM: PROFILE VIEW**

NOT TO SCALE



# PROFILE

## CONCEPTUAL ALUM DOSING STATION AND SEDIMENTATION BASIN: PLAN AND PROFILE

CEDAR LAKE ENGINEERING FEASIBILITY STUDY

Cedar Lake, Indiana

NOT TO SCALE

**HARZA** Consulting Engineers and Scientists

Figure 15





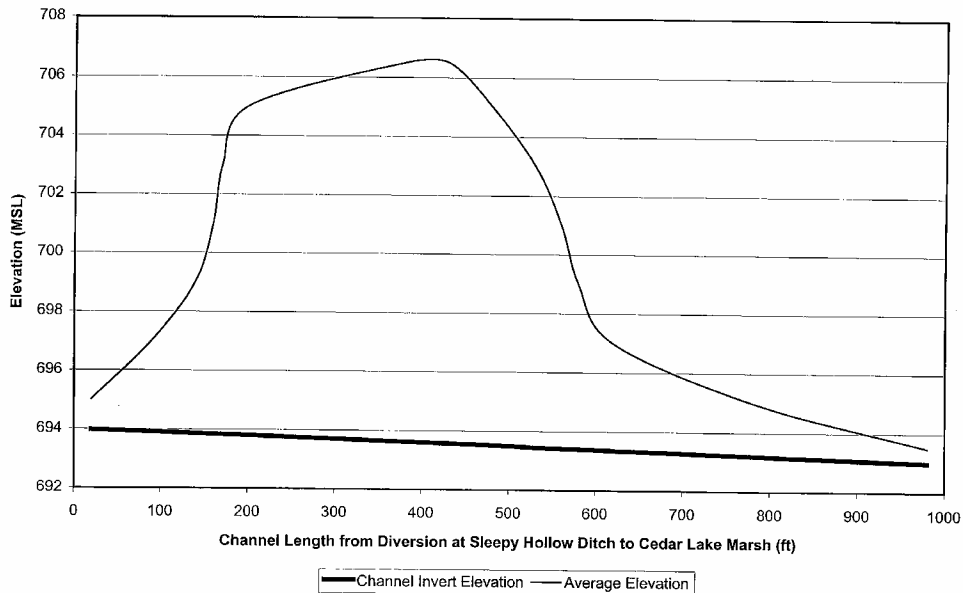
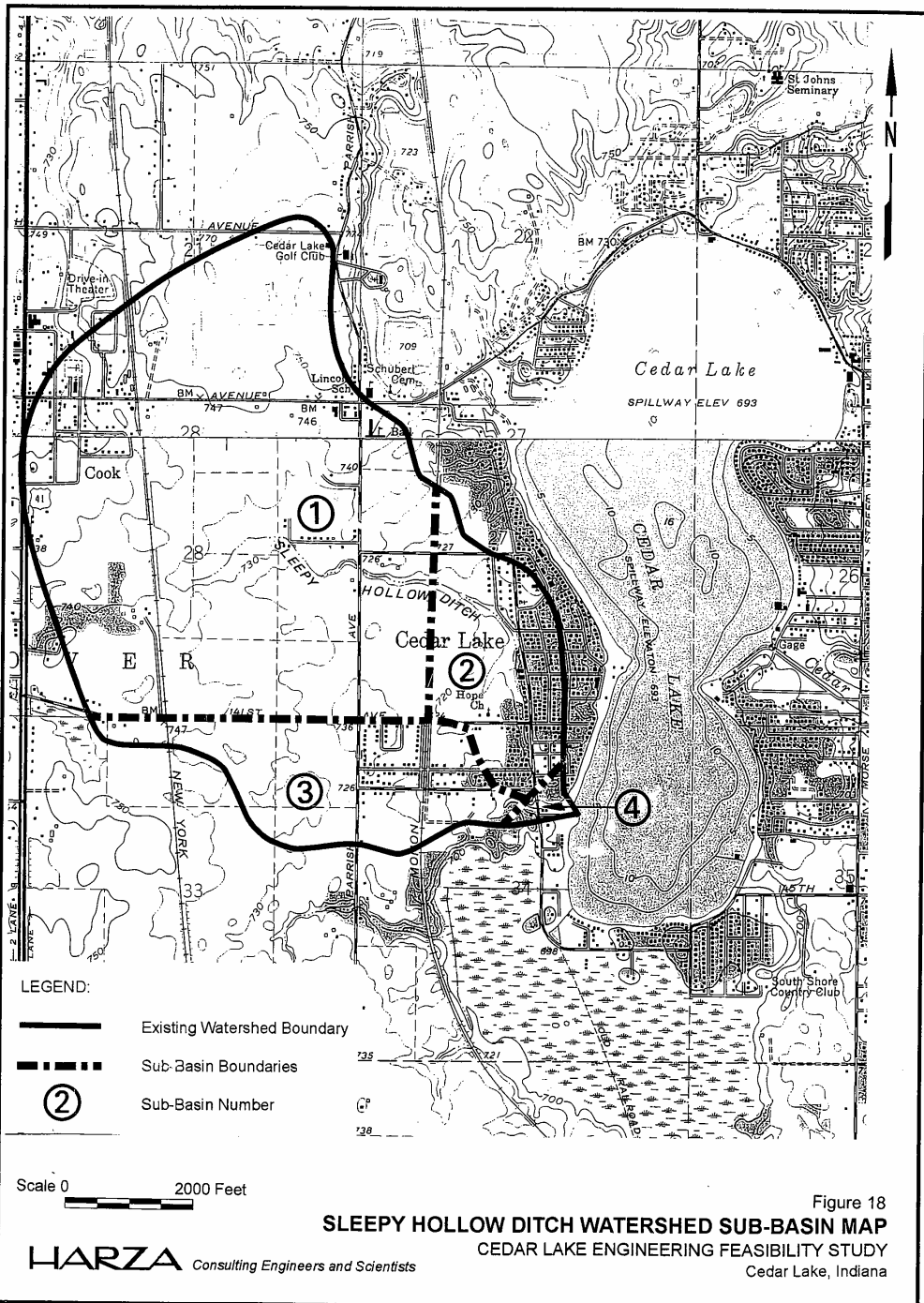
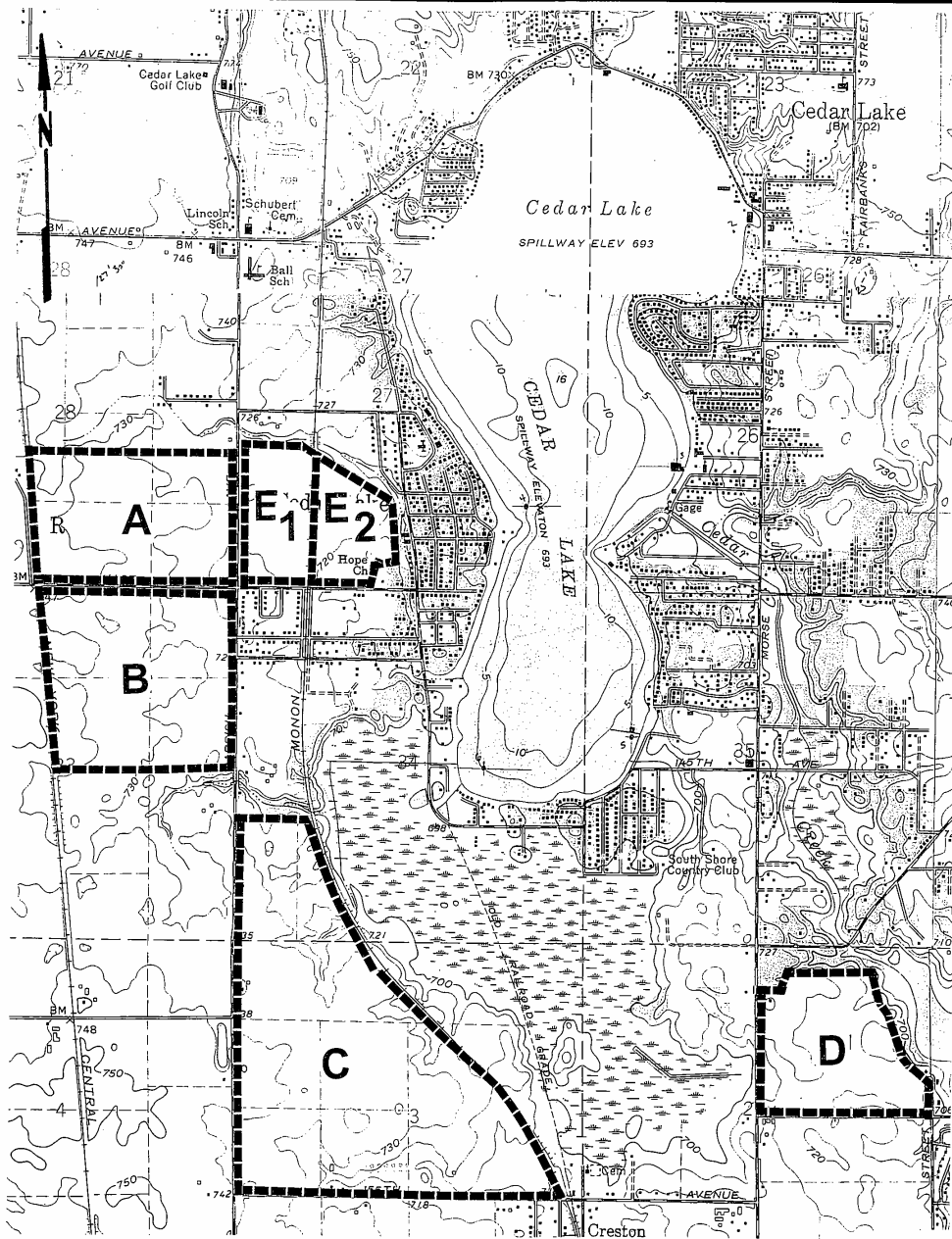


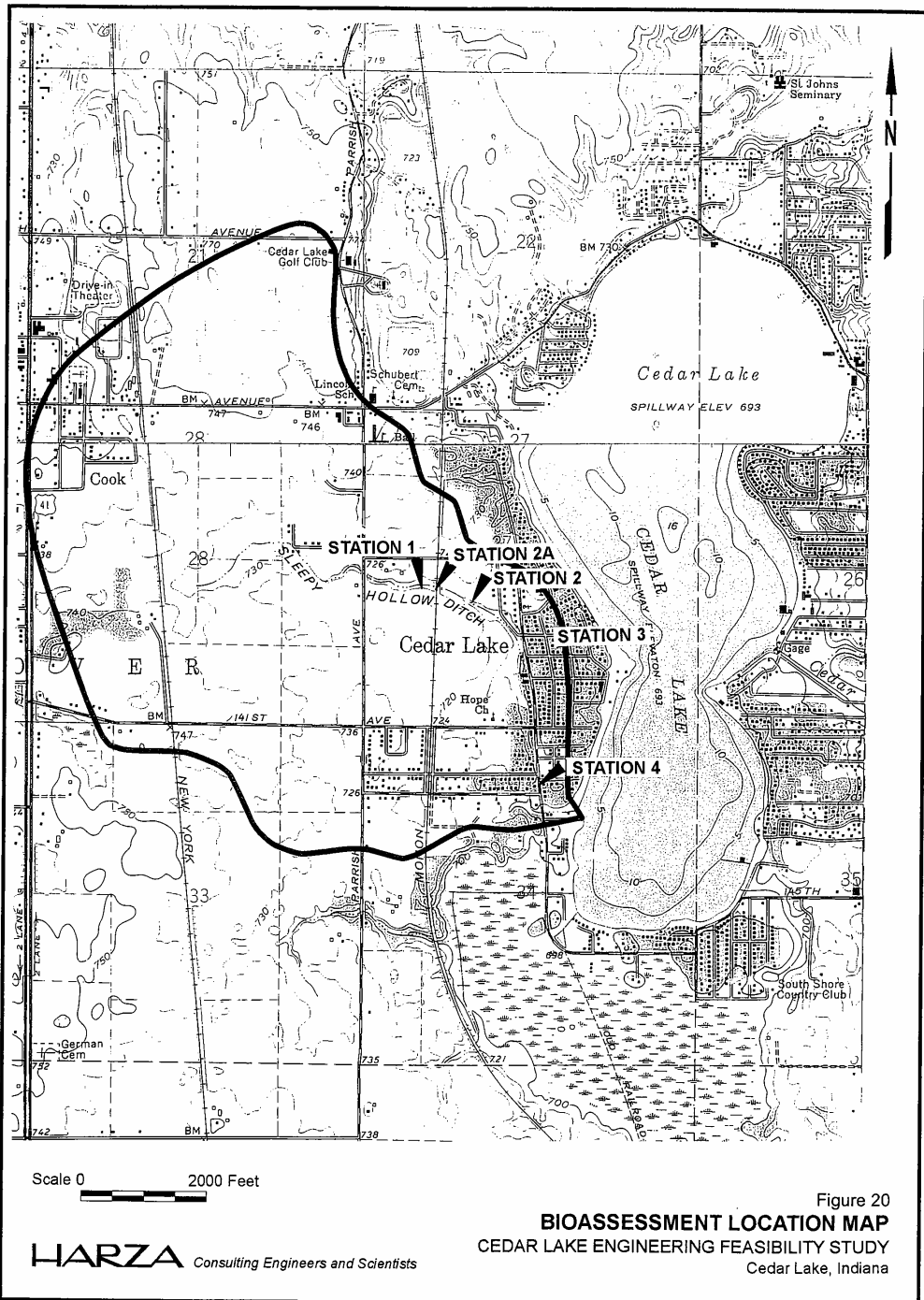
Figure 17  
**SLEEPY HOLLOW DITCH DIVERSION CONTOUR PROFILE**  
CEDAR LAKE ENGINEERING FEASIBILITY STUDY  
Cedar Lake, Indiana





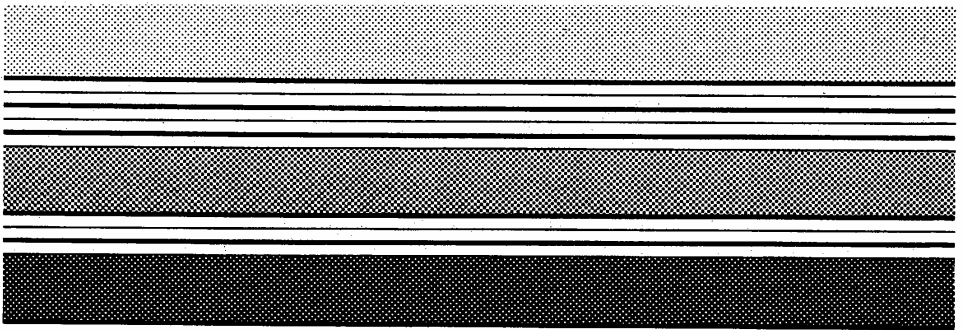


Scale 0 1000 Feet



APPENDIX 1

# TECHNICAL MEMORANDUM



## **CEDAR LAKE ENHANCEMENT PROJECT FEASIBILITY PHASE**

### **Identification of Potential Construction Sites**

This memorandum identifies in-lake, watershed, and policy alternatives for improving water quality at Cedar Lake, Lake County, Indiana. It documents Task 3 in the feasibility study authorized by the Cedar Lake Enhancement Association, Inc. under their Lake and River Enhancement (LARE) grant.

After meeting with interested parties at the Cedar Lake Feasibility Study Public Meeting #1 on February 19, 1998 and reviewing available historical data (Echelberger, Jr. and Jones, 1979; Jones, 1984; and Jones and Marnatti, 1991), the follow alternative improvement measures are reviewed herein, and recommendations are presented for full feasibility level evaluation.

- Alternative 1: Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh
- Alternative 2: Blocking second (unnamed) outlet of Cedar Lake Marsh by the marina
- Alternative 3: Re-routing Hogpen Ditch to its original channel
- Alternative 4: Construction of a control structure at Pickerel Creek
- Alternative 5: Pumping of dilutional groundwater or surface water into Cedar Lake
- Alternative 6: Dredging
- Alternative 7: Alum treatment in Cedar Lake
- Alternative 8: A wet detention structure on Sleepy Hollow Ditch
- Alternative 8a: In-stream Alum Treatment and Sedimentation on Sleepy Hollow Ditch
- Alternative 9: A wet detention structure on the stream leading from the South Shore Country Club
- Alternative 10: Construction of sedimentation basins at the inlets to Cedar Lake Marsh
- Alternative 11: Lake Aeration
- Alternative 12: Biomanipulation

## **Background Information**

Background data on Cedar Lake are available in three reports published by Indiana University (IU). Based upon review of those reports, we surmise the following. Cedar Lake is a 316 hectare (781 acre) lake located in Lake county in northwestern Indiana. The lake is shallow with a maximum depth of only 4.9 meters (16 feet) and a mean depth of 2.7 meters (8.8 feet). The watershed area drained by Cedar Lake is approximately 1841 hectare (4,550 acres) in size exclusive of the lake area itself. Because the lake is so large in comparison with the watershed area, the lake has a slow flushing rate of greater than one year.

When they began their studies of Cedar Lake in the late 1970s, IU investigators concluded that Cedar Lake was nitrogen limited. While it may have been so in those years, several improvements in sanitary sewerage have been implemented that have reduced sewage overflows into the lake. If it has not already happened, Cedar Lake is expected to shift to a phosphorus limited system, and control of that nutrient, rather than nitrogen, will likely result in lessened algal blooms during the growing season. Soluble reactive (available) phosphorus concentrations were noted by IU to increase in the lake throughout the summer until August, when they represent more than 50% of total lake phosphorus. Nitrate levels decrease through the spring and remain near zero during the summer. Data suggest that the high water column phosphorus concentrations in Cedar Lake are due largely to the release of phosphorus from sediments. Internal loading of phosphorus is estimated to account for 84% of the total loading of phosphorus to Cedar Lake. Phosphorus concentrations in the sediments were measured to be highest in the upper 40-50 centimeters.

Within the watershed there are six streams, all of which cease to flow during dry periods. Three of these are considered inlets to the lake. Historically, Sleepy Hollow Ditch, an inlet at the west side of the lake, maintained flow over the entire year due to the effluent it received from the wastewater treatment for the Utopia subdivision which operated from 1956 to 1977. The two inlets on the south and southwest side drain a large 403 acre (163 hectare) wetland, which, in turn drain approximately one-half of the drainage basin. A stream on the southeast side connects Cedar Lake to a small golf course irrigation pond. Another stream at the northern end of the lake drains a small 14 acre (5.7

hectare) wetland. Cedar Creek, located on the east side of the middle basin is the only outlet to Cedar Lake. This creek is also an intermittent stream and generally has no flow during the summer months. Watershed land use includes 4% forest lands, 9% wetlands, 24% urban lands, and 63% agricultural and open land.

In their latest report, IU investigators (Jones and Marnatti, 1991) used the Agricultural Nonpoint Source Model (AGNPS) to identify potential nonpoint pollution sources and magnitudes in the Cedar Lake watershed. The model suggests that of the major inlet streams, the South Shore Country Club Drain carries the largest average runoff (251 m<sup>3</sup>/ac), sediment yield (0.66 tons/ac), sediment phosphorus (1.14 lbs/ac) and soluble phosphorus (2.76 lbs/ac). The largest amount of total phosphorus loading (sediment and soluble) enters Cedar Lake through the south wetland inlet that drains 1320 acres of mostly agricultural land to the south of the lake. Highest predicted sediment losses are from the Cedar Point and Woodland Shores residential areas and from the South Shore Country Club. Peak runoff volumes are concentrated along the Sleepy Hollow Ditch area and the two wetland outlets into the lake. Soil erosion is most severe along the west side of the lake, areas draining through Sleepy Hollow Ditch, areas draining into the Cedar Lake marsh and areas draining through the South Shore Country Club Drain. Sediment phosphorus yield is evenly distributed throughout the watershed area although the northwest part of the watershed appears to have heavier overall yields (areas draining through Sleepy Hollow Ditch). Soluble phosphorus and nitrogen yield results are very similar to the soil erosion results. Results from the Hogpen Ditch watershed suggest, Hogpen Ditch has a large volume of water that has below average sediment phosphorus yields and below average soluble phosphorus yields.

## **Description of Alternatives**

Alternatives 1 and 2: Diversion of Sleepy Hollow Ditch into Cedar Lake Marsh and Blocking Second (Unnamed) Outlet of Cedar Lake Marsh by the Marina. Jones and Marnatti (1991) recommended that Sleepy Hollow Ditch be re-routed along Lauerman Street into Cedar Lake Marsh. Blocking of the second (unnamed) outlet of Cedar Lake Marsh entering the marina (also identified in Jones and Marnatti's recommendations) would most likely be required in order to increase flow

paths and prevent short circuiting. In order for this alternative to be implemented, it will require permits from the Corp of Engineers and Indiana DNR Division of Water. Securing these permits will increase costs. Possible negative effects include loss or modification of wetland habitat and disruption or destruction of existing hydrology and detention capabilities. Recent data suggests that Cedar Lake Marsh is identified as a “high quality community” by the Indiana Natural Heritage Data Center and it also contains a state endangered plant, horned pondweed (*Zannichellia palustris*). Because of this, required permits would most likely be denied or compensation mitigation would likely be required before the permit could be approved. We also consider the potential adverse effects on the Cedar Lake Marsh to be significant, and, depending on existing soils and vegetation communities, this may trigger an Environmental Impact Statement (EIS) under the National Environmental Policy Act. Other concerns include easement availability, road crossings, and topography. Benefits include the potential ease of construction and reduced pollutant loading to Cedar Lake.

Alternative 3: Re-routing Hogpen Ditch to its Original Channel. The AGNPS model results indicate Hogpen Ditch has above average water quality. Historically this stream drained into Cedar Lake near the lake outlet, Cedar Creek. Because of the proximity of the previous Hogpen Ditch to the current lake outlet, rerouting Hogpen Ditch to its original channel would most likely result in short circuiting to the Cedar Creek. The beneficial effects of the additional flushing would not be significant. The potential for water quality improvement would be greatly enhanced if a new inlet for this ditch could be located further north along the lake. Relocating this inlet further north would most likely result in a smaller watershed area and much smaller runoff and stream baseflow water volumes, again minimizing the flushing benefits of re-routing Hogpen Ditch. Construction of an underwater groin to direct the flow of Hogpen Ditch into the main body of the lake would mitigate short-circuiting, but costs would be significant. Permits from the Corps of Engineers and DNR Division of Water would also be required.

Alternative 4: Construction of a Control Structure at Pickerel Creek. This alternative could provide for increased detention and treatment within the Cedar Lake Marsh. Reducing flow rates and volumes and increasing detention time would lead to greater sedimentation and nutrient removal.

This alternative has some of the same negative impacts as those of Alternatives 1 and 2. Permits would be needed from the Corp of Engineers and DNR Division of Water. Other possible negative impacts include loss or modification of wetland habitat, in particular the endangered plant identified in Alternatives 1 and 2, and disruption or destruction of existing hydrology and detention capabilities.

Alternative 5: Pumping of Dilutional Groundwater or Surface Water into Cedar Lake. This alternative has been considered historically in greater detail (Echelberger, Jr. and Jones, 1979). They concluded that “the general lack of readily available source water for dilution makes this technique for the restoration of Cedar Lake difficult.” They further state that the large size of Cedar Lake and its morphology complicate the applicability of this technique. Groundwater was pumped into Cedar Lake in the past and that did not significantly decrease the nutrient concentrations. Instead, groundwater supplies were depleted. Harza’s experience in studying similar lake management applications in northern Indiana and suburban Chicago indicates that groundwater frequently has higher concentrations of soluble phosphorus than the eutrophic lake intended to be enhanced. Therefore, this alternative does not appear attractive.

Alternative 6: Dredging of Cedar Lake. This alternative has been addressed multiple times in the past. It was generally ruled out because of the large costs and the lack of availability of a dredge disposal site in the immediate area. Dredging sediment to a depth of one foot in Cedar Lake would produce about 1.25 million yd<sup>3</sup> of spoil that would need to be disposed of at an upland site. Permits would be needed from the Corps or DNR. Given the magnitude of internal nutrient loading in this lake, water quality benefits would be significance. IU researchers estimated that about 85% of the annual phosphorus load to the lake is recycled from within, a phenomenon termed internal loading. This implies significantly greater benefits are possible from controlling this source rather than external or watershed loadings.

Alternative 7: Alum Treatment in Cedar Lake. In-lake alum treatment has been explored in the past. Concerns included costs associated with the large amounts of alum required and possible requirement of subsequent treatments. Because the lake is shallow and the potential for natural and



boat-induced waves are great, we believe that the alum will resuspend from the sediment layer, concentrate in the deepest, most central portion of the lake, and therefore prove less effective. The roiling effects of carp would also tend to reduce the effectiveness of this management measure. There are not many case studies of whole-lake alum treatments in lakes as shallow as Cedar Lake. Immediate improvements in water clarity and reductions in soluble phosphorus will occur, light penetration would greatly increase and the ability of aquatic plants to grow in the lake would increase. While it is common to be concerned about the ecotoxicity of alum, experience has shown that, when properly performed by qualified, experienced contractors, this alternative will not have deleterious effects.

Alternative 8: Wet Detention Structure on Sleepy Hollow Ditch. This structure would serve a similar purpose as re-directing the ditch into Cedar Lake Marsh. A small wetland, sedimentation basin, check dams, or combination thereof could be constructed along Sleepy Hollow ditch along with stream channel improvements. This would provide for reduced flow rates, decreased sedimentation loads, detention, and the potential for nutrient pretreatment. This structure could also provide aesthetics enhancements and increased habitat areas while serving its designed purpose. Because this area drains large areas of agricultural land, the potential for land availability for this project is improved.

Alternative 8a: In-stream Alum Treatment and Sedimentation on Sleepy Hollow Ditch. This alternative would also address nutrients and sediments in Sleepy Hollow Ditch. This design would rely on an in-stream alum treatment system and immediate routing through a sedimentation basin. This would most likely be designed near the discharge of Sleepy Hollow Ditch into Cedar Lake. The water would be treated with alum and allowed to settle out in an in-lake sedimentation basin before discharging into the lake. This would provide the potential for nutrient treatment and reduced sediment loads into the lake. Land availability would be less of a concern as the sedimentation basin could be designed around the existing stream inlet into the lake. Phosphorus removal by chemical addition, alum, iron, or lime, is a commonly used technique in advanced wastewater treatment in order to obtain phosphorus removal in the range of 85%-95%.

Alternative 9: Wet Detention Structure on the Stream Leading from the South Shore Country Club. IU's AGNPS modeling suggests that the waters entering through this inlet are among the most polluted when averaged over its watershed area. Potential solutions for this area are similar to those presented for Alternative 8. Open land resources in this area, particularly closer to the lake, appear to be available. The amount of watershed drained through this inlet is minimal though.

Alternative 10: Sedimentation Basins at the Inlets to Cedar Lake Marsh. It has been shown that Cedar Lake Marsh acts as a sink for sediment and nutrients (Jones and Marnatti, 1991). In order to preserve this capacity and potentially enhance it, small check dams or sedimentation basins could be constructed at the inlets to Cedar Lake Marsh. This would provide an area for sedimentation to occur, and buffer impacts to the wetland. Properly designed, these sedimentation basins could be dredged as needed.

Alternative 11: Lake Aeration. Lake aeration does not remove nutrients from the lake. It mixes and adds oxygen to the water, and may stir up bottom sediments in a lake as shallow as Cedar Lake. Algae blooms are modified, and blue-green algal surface mats may be reduced, in favor of pelagic green algae species. Nuisance mats and odors may be eliminated. Because the surface area of the lake is so large, many discharge charge points would most likely be required. Combining this with the fact that nutrient sources aren't addressed makes this alternative less appealing.

Alternative 12: Biomanipulation. Biomanipulation involves stocking of the lake with high numbers of top predator fish. These fishes feed on smaller fishes like bluegill who feed on zooplankton. As the zooplankton predators are reduced, zooplankton numbers greatly increase, and their food source, phytoplankton, is reduced significantly. Biomanipulation applies basic food web concepts, and is sound, but water quality benefits are difficult to predict.

## Summary and Recommendations

The thirteen identified alternatives include both prevention and restoration options for Cedar Lake. Table 1 presents a brief synopsis of the potential benefits and disadvantages of each alternative. Because of the low flushing rate of Cedar Lake, improvements in water quality resulting from detention and treatment have little overall significance when averaged over the large volume of water contained in the lake. Therefore, solutions only addressing source water coming into the lake will in all likelihood prevent the lake from becoming further nutrient enriched; but, the rate of natural lake recovery will be measured in decades because of the large soluble and sediment phosphorus in Cedar Lake. Addressing only nutrient concerns in the lake will provide a more immediate remedy; but, eventually the input of new nutrients will replace those that have been removed. Therefore, with the data to date, a positive solution would most likely require a combination of source control and sink removal or deactivation. This could be accomplished with dredging or lake alum treatment and a combination of watershed controls.

At this time, we consider the most feasible alternatives to be Alternative 8 or Alternative 8a. These alternatives that address Sleepy Hollow Ditch would address most of the non-treated off-site nutrients and sediments and provide the most potential benefits for the cost. We propose to further analyze these two alternatives in the feasibility study. With improved outside control of nutrients and sediments, dredging, if performed, will have a more long term impact and will potentially improve lake water and sediment quality. Future work is also recommended on providing a feasibility study for dredging.

We recommend that the Cedar Lake Enhancement Association undertake a more detailed study of the potential costs and benefits of dredging some or all of Cedar Lake. Preliminary estimates for dredging costs can vary considerably mainly as a function of dredging spoils pumping distance. Assuming hydraulic dredging, a preliminary cost of \$4 to \$5 per cubic yard of dredge spoil is estimated. These numbers are based on projects similar in size and scope and include costs of construction of dredge spoil de-watering facilities. Table 2 shows an estimate of dredge costs based on multiple removal areas and depths. Because of this very large range, \$786,500 to \$12.6 million,

it is recommended that only areas which will truly benefit water quality be dredged. Elements of the study would include the following:

- Detailed Sediment Quality Survey. The objective of this survey would be to determine the depth and area of the lake to be dredged that would most improve water quality.
- Spoil Disposal Site Selection. Determine the availability and suitability of one or more spoil disposal areas.
- Sedimentation Engineering. Equipment selection, construction cost estimation, and construction scheduling.

Depending on the detail of these analyses (reconnaissance, pre-feasibility, feasibility, or design level), the cost of this study might range from \$30,000 to \$150,000.

**Table 1. Summary of Benefits and Disadvantages of Lake Enhancement Alternatives**

Alternative	Benefits	Disadvantages	Comments
1. Diversion of Sleepy Hollow Ditch	<ul style="list-style-type: none"> <li>-Reduced sediment loads</li> <li>-Probable reduced nutrient loads</li> <li>-Water quality degradation preventive measure</li> <li>-Long term solution</li> <li>-Estimated yearly lake water quality improvement = 4%</li> </ul>	<ul style="list-style-type: none"> <li>-Permits required</li> <li>-Land acquisition</li> <li>-Road crossings</li> <li>-Probable ecological and hydrology negative impacts</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> <li>-State endangered species and "high quality community" potentially impacted</li> </ul>	Small volume of input relative to lake volume
2. Blocking Cedar Lake Marsh Outlet	Combined with Alt. 1	Combined with Alt. 1	Combined with Alt. 1
3. Re-routing of Hogpen Ditch	<ul style="list-style-type: none"> <li>-Increased water volumes</li> <li>-Estimated yearly lake water quality improvement = 4% including a pretreatment structure</li> </ul>	<ul style="list-style-type: none"> <li>-Land Acquisition</li> <li>-Pretreatment structure required</li> <li>-Road Crossing</li> <li>-Potential impact on previous drainage way and watershed</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> <li>-Short circuiting potential</li> </ul>	Small volume of input relative to lake volume
4. Control Structure at Pickeral Creek	<ul style="list-style-type: none"> <li>-Increased detention time</li> <li>-Increased sedimentation</li> <li>-Probable reduced nutrient loads</li> <li>-Water quality degradation preventive measure</li> <li>-Long term solution</li> <li>-Estimated yearly lake water quality improvement = 4%</li> </ul>	<ul style="list-style-type: none"> <li>-Permits required</li> <li>-Probable ecological and hydrology negative impacts</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> <li>-State endangered species and "high quality community" potentially impacted</li> </ul>	Small volume of input relative to lake volume

**Table 1. Summary of Benefits and Disadvantages of Lake Enhancement Alternatives**

Alternative	Benefits	Disadvantages	Comments
5. Pumping of Dilutional Water	<ul style="list-style-type: none"> <li>-Higher quality water in particular with pumping groundwater</li> <li>-Eventually approximately 65% lake water quality improvement</li> </ul>	<ul style="list-style-type: none"> <li>-Lack of source water</li> <li>-Costs</li> <li>-Operation and maintenance</li> <li>-Large volume required</li> <li>-Short term solution; doesn't address source</li> </ul>	
6. Dredging of Cedar Lake	<ul style="list-style-type: none"> <li>-Improved water and sediment quality.</li> <li>-Approximately 30% lake water quality improvement (Jones, 1984)</li> </ul>	<ul style="list-style-type: none"> <li>-Costs (millions of dollars; see Table 2)</li> <li>-Environmental and aesthetic impacts</li> <li>-Short term solution if outside sources not addressed first</li> <li>-Potential resuspension of nutrients to water during dredging</li> <li>-Large volume of dredging will require multiple years</li> </ul>	
7. Alum Treatment in Cedar Lake	<ul style="list-style-type: none"> <li>-Improved lake water quality with respect to phosphorus</li> <li>-Provides sediment/water interface transfer barrier</li> <li>-Approximately 75% lake water quality improvement</li> </ul>	<ul style="list-style-type: none"> <li>-Possible need for re-application</li> <li>-Possible wave resuspension of alum causing potential leaching of nutrients</li> <li>-Equipment costs</li> <li>-Operation and Maintenance costs</li> <li>-Doesn't address watershed sources</li> </ul>	

**Table 1. Summary of Benefits and Disadvantages of Lake Enhancement Alternatives**

Alternative	Benefits	Disadvantages	Comments
8. Detention Structure on Sleepy Hollow Ditch	<ul style="list-style-type: none"> <li>-Reduced sediment loads</li> <li>-Probable reduced nutrient loads</li> <li>-Habitat and aesthetics values</li> <li>-Storm water detention</li> <li>-Water quality degradation preventive measure</li> <li>-Long term solution</li> <li>-Estimated yearly lake water quality improvement = 4%</li> </ul>	<ul style="list-style-type: none"> <li>-Land acquisitions</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> </ul>	Small volume of input compared to lake volume
8a. In-stream Alum Treatment and Sedimentation on Sleepy Hollow Ditch	<ul style="list-style-type: none"> <li>-Reduced sediment loads</li> <li>-Reduced nutrient loads</li> <li>-Equally effective for decreasing sediment and soluble phosphorus</li> <li>-Storm water detention</li> <li>-Water quality degradation preventive measure</li> <li>-Estimated yearly lake water quality improvement = 8%</li> </ul>	<ul style="list-style-type: none"> <li>-Equipment costs ~\$100,000</li> <li>-Electrical service requirements</li> <li>-Gradual water quality improvements</li> <li>-No ecological or habitat benefits</li> <li>-Operation and maintenance costs (~\$20,000/yr)</li> </ul>	
9. Detention Structure on Creek Leading from South Shore Country Club	<ul style="list-style-type: none"> <li>-Reduced sediment loads</li> <li>-Probable reduced nutrient loads</li> <li>-Habitat and aesthetics values</li> <li>-Storm water detention</li> <li>-Water quality degradation preventive measure</li> <li>-Long term solution</li> <li>-Estimated yearly lake water quality improvements are negligible</li> </ul>	<ul style="list-style-type: none"> <li>-Land acquisition</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> </ul>	Negligible water volume input compared to lake volume

**Table 1. Summary of Benefits and Disadvantages of Lake Enhancement Alternatives**

Alternative	Benefits	Disadvantages	Comments
10. Sedimentation Basins at Inlets to Cedar Lake Marsh	<ul style="list-style-type: none"> <li>-Reduced sediment loads</li> <li>-Probable reduced nutrient loads</li> <li>-Limited detention</li> <li>-Ease of maintenance and cleaning</li> <li>-Protection of wetland from large flow volumes and sediment inputs</li> <li>-Water quality degradation preventive measure</li> <li>-Long term solution</li> <li>-Estimated yearly lake water quality improvement = 4%</li> </ul>	<ul style="list-style-type: none"> <li>-Land acquisitions</li> <li>-Maintenance</li> <li>-Gradual water quality improvements</li> <li>-Waters through Cedar Lake Marsh are already filtered by the wetland</li> </ul>	
11. Lake Aeration	<ul style="list-style-type: none"> <li>-Increased dissolved oxygen</li> <li>-Reduced odors</li> <li>-Water quality degradation preventive measure</li> </ul>	<ul style="list-style-type: none"> <li>-Does not remove nutrients</li> <li>-Would require multiple aerators</li> <li>-Operation and maintenance costs</li> </ul>	
12. Biomanipulation	<ul style="list-style-type: none"> <li>-Removes unwanted and nuisance species</li> <li>-Can provide water quality benefits</li> <li>-Provides ecological and habitat benefits</li> <li>-Water quality degradation preventive measure</li> </ul>	<ul style="list-style-type: none"> <li>-Doesn't address watershed sources of concern (i.e., sediment and nutrients)</li> <li>-Difficult to predict water quality benefits</li> <li>-Continued degraded conditions may cause shifting back to existing conditions</li> </ul>	

Assumptions used in calculation of percent benefits include:

- Runoff coefficient (c) = 0.20 (Typical for this area and conditions)
- Precipitation total of 38.37 inches (Average from 1900-1996 for Valparaiso, Indiana)
- Estimated that treatment structures would reduce soluble phosphorus concentrations by 30% and sediment phosphorus concentrations by 70% (Values vary depending on season and detention time)
- Estimated that in-stream alum treatment would reduce phosphorus concentrations by 80%
- Conservation of mass and perfect mixed conditions
- Sediments don't leach additional nutrients upon input of cleaner water



**Table 2: Preliminary Estimated Dredge Costs**

Dredge Area (acres)	781 Whole Lake	781 Whole Lake	781 Whole Lake	781 Whole Lake
Average Dredge Depth (ft)	2	1.5	1	0.5
Dredge Volume (yd <sup>3</sup> )	2,520,027	1,890,020	1,260,013	630,007
Estimated Dredge Cost at \$5/yd <sup>3</sup>	\$12,600,133	\$9,450,100	\$6,300,067	\$3,150,033
Dredge Area (acres)	586 3/4 of Lake	586 3/4 of Lake	586 3/4 of Lake	586 3/4 of Lake
Average Dredge Depth (ft)	2	1.5	1	0.5
Dredge Volume (yd <sup>3</sup> )	1,890,827	1,418,120	945,413	472,707
Estimated Dredge Cost at \$5/yd <sup>3</sup>	\$9,454,133	\$7,090,600	\$4,727,067	\$2,363,533
Dredge Area (acres)	391 ½ of Lake	391 ½ of Lake	391 ½ of Lake	391 ½ of Lake
Average Dredge Depth (ft)	2	1.5	1	0.5
Dredge Volume (yd <sup>3</sup> )	1,261,627	946,220	630,813	315,407
Estimated Dredge Cost at \$5/yd <sup>3</sup>	\$6,308,133	\$4,731,100	\$3,154,067	\$1,577,033
Dredge Area (acres)	195 1/4 of Lake	195 1/4 of Lake	195 1/4 of Lake	195 1/4 of Lake
Average Dredge Depth (ft)	2	1.5	1	0.5
Dredge Volume (yd <sup>3</sup> )	629,200	471,900	314,600	157,300
Estimated Dredge Cost at \$5/yd <sup>3</sup>	\$3,146,000	\$2,359,500	\$1,573,000	\$786,500

[illegible]

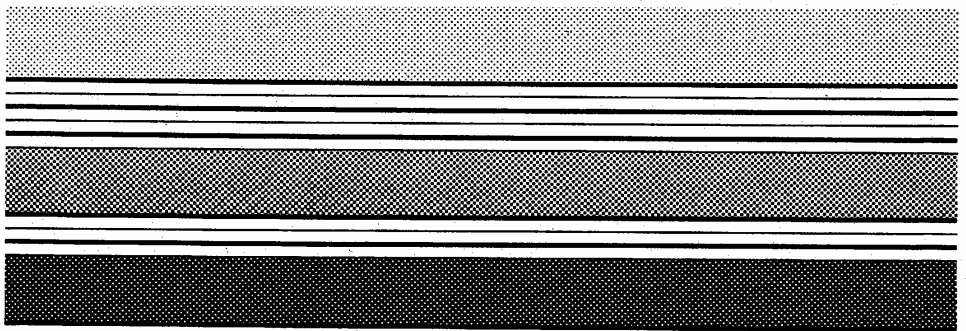
## Cedar Lake Sedimentation Basin Design

	Design 1	Design 2	Design 3	Design 4	Design 5	Design 6	Design 7	Design 8
<b>V= Design sediment storage capacity (acre-ft)</b>	<b>74</b>	<b>59</b>	<b>44</b>	<b>30</b>	<b>22</b>	<b>15</b>	<b>7</b>	<b>3</b>
E= Average rate of erosion in the watershed (tons/acre/yr)	10	10	10	10	10	10	10	10
A= Watershed area (acres)	950	950	950	950	950	950	950	950
DR= Sediment delivery ration for watershed in %	75	75	75	75	75	75	75	75
G= Estimated sediment density in the basin (lb/ft^3)	75	75	75	75	75	75	75	75
TE= Trap efficiency in %	68	68	68	68	68	68	68	68
<b>Y= Design storage period (yrs)</b>	<b>25</b>	<b>20</b>	<b>15</b>	<b>10</b>	<b>7.5</b>	<b>5</b>	<b>2.5</b>	<b>1</b>
<b>Depth Allocations (%)</b>								
<b>Deep (6-6.5)</b>	2%	2%	2%	2%	2%	2%	2%	2%
<b>Moderate (4-6)</b>	6%	6%	6%	6%	6%	6%	6%	6%
<b>Shallow (2-4)</b>	18%	18%	18%	18%	18%	18%	18%	18%
<b>Saturated (0-2)</b>	74%	74%	74%	74%	74%	74%	74%	74%
<b>Required Land Area (acres)</b>	<b>43.5</b>	<b>34.8</b>	<b>26.1</b>	<b>17.4</b>	<b>13.0</b>	<b>8.7</b>	<b>4.3</b>	<b>1.7</b>

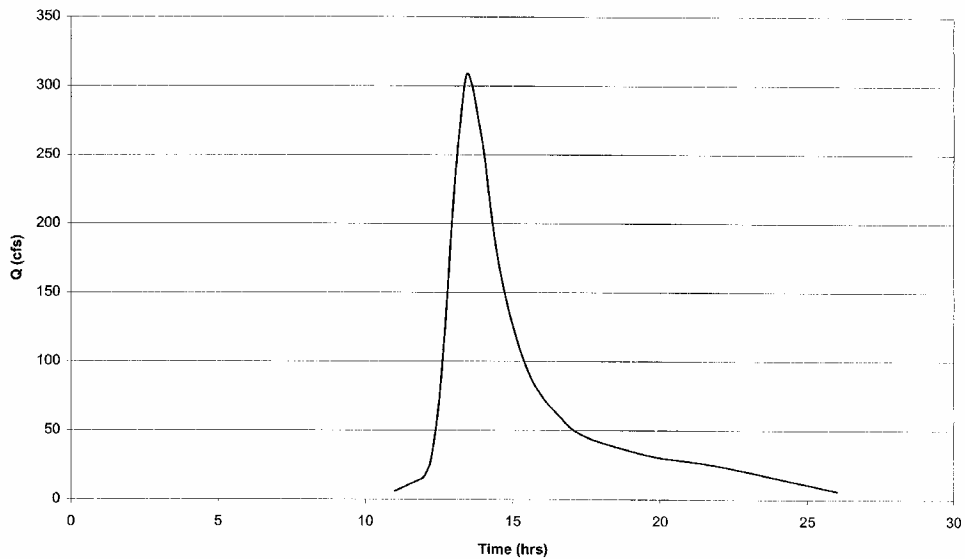
The total Sleepy Hollow Ditch Watershed is estimated to be 1250 acres. Of this 1250 acres, approximately 75% or 950 acres of it drains through the location of the proposed wetland treatment system

## APPENDIX 3

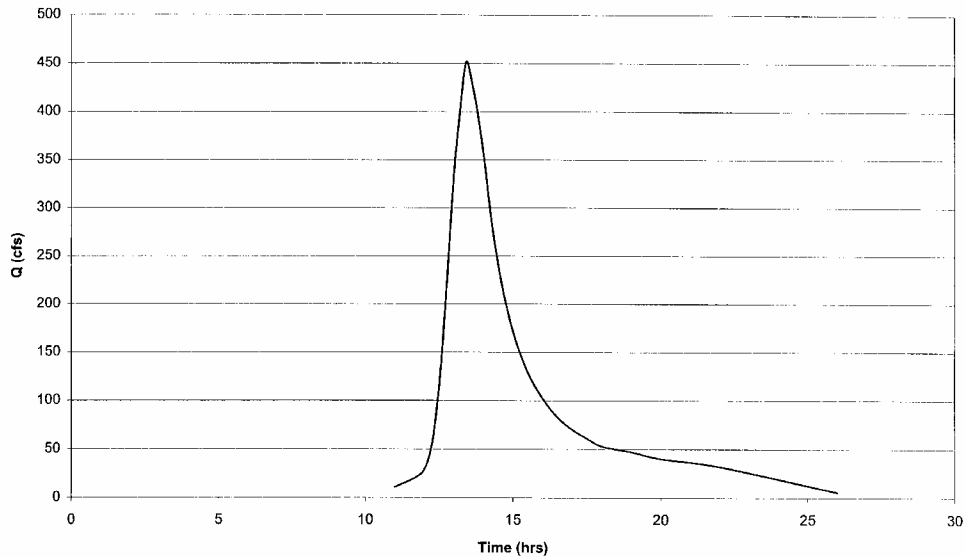
# TR-55 MODELING OUTPUT



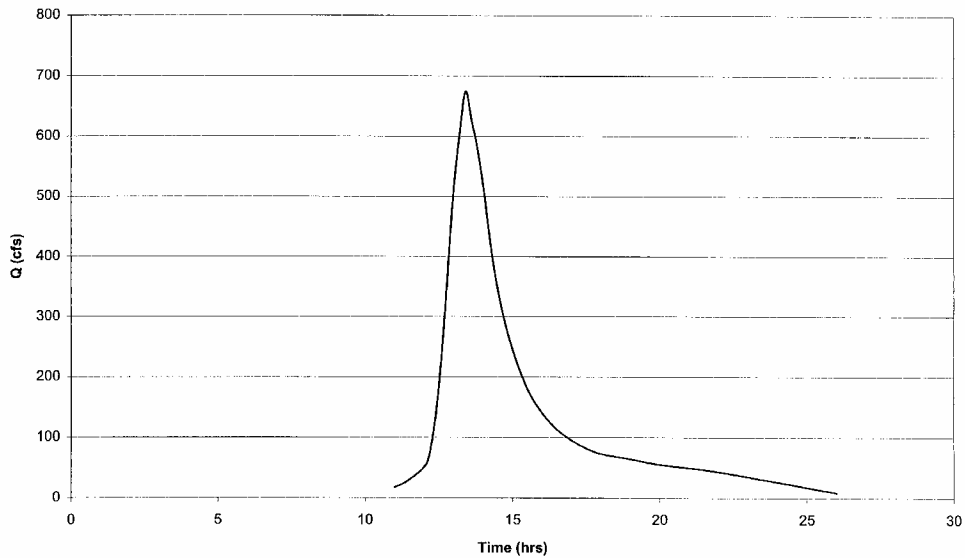
**Hydrograph for a 1 Year, 24-Hour Storm  
Upstream of Proposed Wetland System**



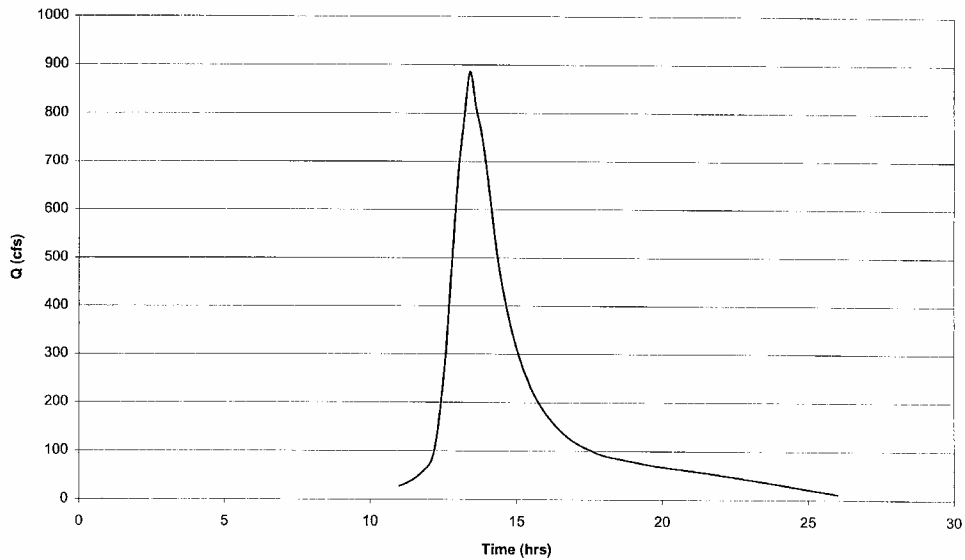
**Hydrograph for a 2 Year, 24-Hour Storm  
Upstream of Proposed Wetland System**



**Hydrograph of a 5 Year, 24-Hour Storm  
Upstream of Proposed Wetland System**

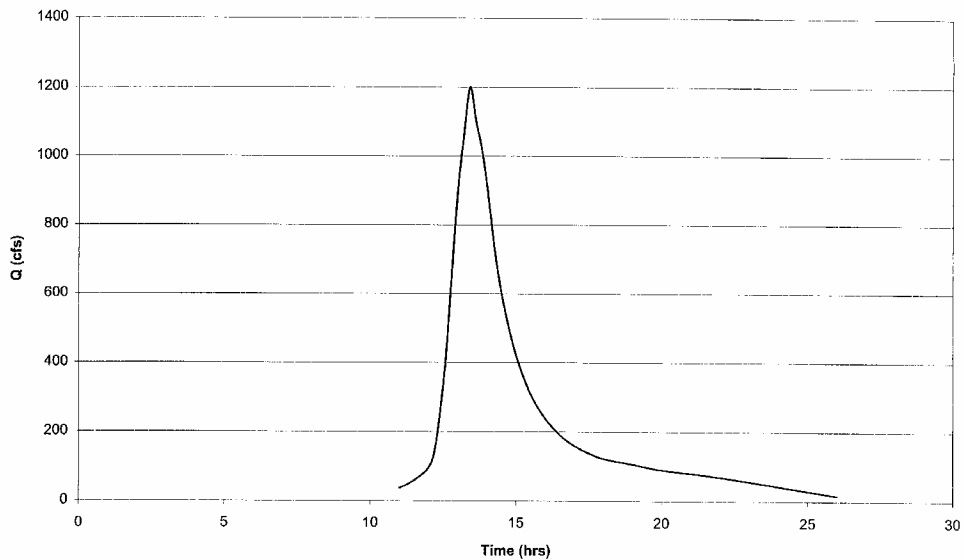


**Hydrograph of 10 Year, 24-hour Storm  
Upstream of Wetland System**

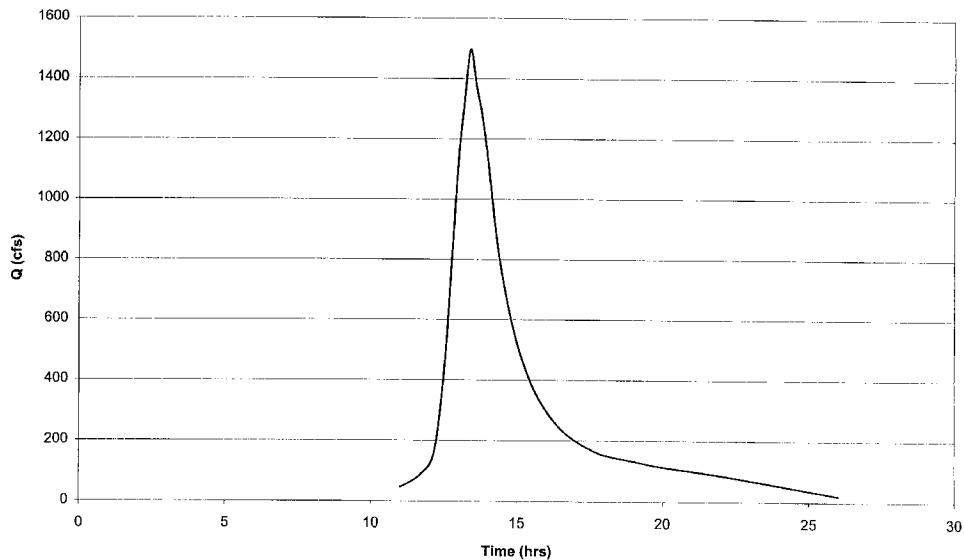




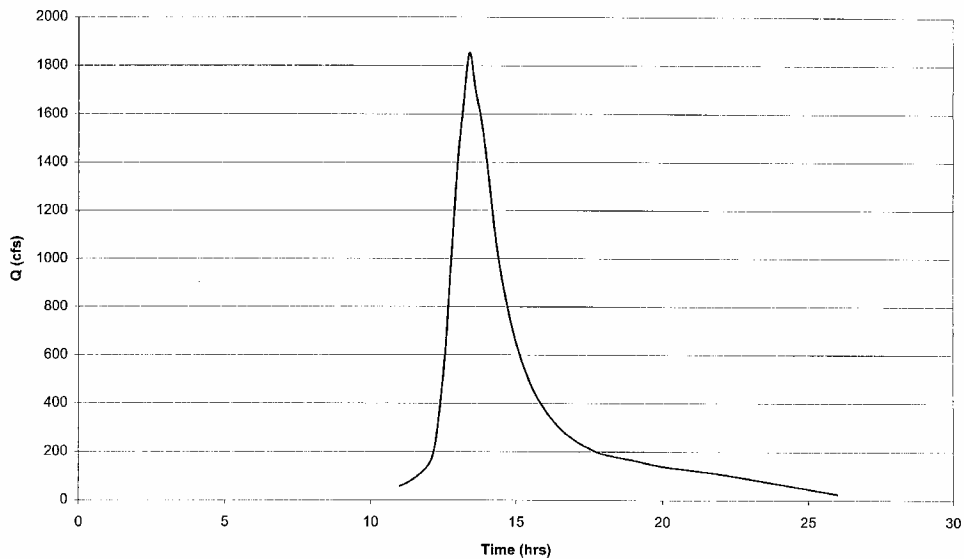
**Hydrograph of 25 Year, 24-Hour Storm  
Upstream of Wetland System**



**Hydrograph of 50 Year, 24-Hour Storm  
Upstream of Wetland System**



**Hydrograph of 100 Year, 24-Hour Storm  
Upstream of Wetland System**



## STORAGE VOLUME FOR DETENTION BASINS

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland System of Sleepy Hollow Ditch

Drainage Area: 950 Acres

Rainfall Frequency: 2 years

Rainfall-Type: II

24-Hour Rainfall: 3.04 inches

Runoff Curve Number: 82

Peak Inflow: 451 cfs

Detention Basin Storage Volume: 22 acre-feet

Runoff Volume: 1.4 inches

Peak Outflow: 332 cfs

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 1 years

	SHD
Area(sq mi)	1.50
Rainfall(in)	2.5
Curve number	82
Runoff(in)	1.01
Tc (hrs)	2.00
TimeToOutlet	0.00
Ia/P	0.17

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)
11.0	6	6
11.3	9	9
11.6	12	12
11.9	15	15
12.0	17	17
12.1	21	21
12.2	27	27
12.3	39	39
12.4	54	54
12.5	74	74
12.6	100	100
12.7	128	128
12.8	161	161
13.0	226	226
13.2	273	273
13.4	308P	308P
13.6	300	300
13.8	277	277
14.0	252	252
14.3	199	199
14.6	161	161
15.0	125	125
15.5	93	93
16.0	74	74
16.5	62	62
17.0	51	51
17.5	45	45
18.0	41	41
19.0	35	35
20.0	30	30
22.0	24	24
26.0	6	6

P - Peak Flow

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 2 years

----- Subareas -----

SHD  
Area(sq mi) 1.50  
Rainfall(in) 3.0  
Curve number 82  
Runoff(in) 1.41  
Tc (hrs) 2.00  
TimeToOutlet 0.00  
Ia/P 0.14

Time Total ----- Subarea Contribution to Total Flow (cfs) -----  
(hr) Flow SHD

11.0	11	11
11.3	15	15
11.6	19	19
11.9	25	25
12.0	30	30
12.1	36	36
12.2	47	47
12.3	63	63

12.4	87	87
12.5	116	116
12.6	152	152
12.7	197	197
12.8	243	243
13.0	336	336
13.2	400	400
13.4	451P	451P

13.6	430	430
13.8	398	398
14.0	355	355
14.3	279	279
14.6	224	224
15.0	171	171
15.5	129	129
16.0	102	102

16.5	83	83
17.0	70	70
17.5	61	61
18.0	53	53
19.0	47	47
20.0	40	40
22.0	32	32
26.0	6	6

P - Peak Flow

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 5 years

----- Subareas -----

SHD  
Area(sq mi) 1.50  
Rainfall(in) 3.8  
Curve number 82  
Runoff(in) 2.03  
Tc (hrs) 2.00  
TimeToOutlet 0.00  
Ia/P 0.12

Time Total ----- Subarea Contribution to Total Flow (cfs) -----  
(hr) Flow SHD

11.0 18 18  
11.3 24 24  
11.6 34 34  
11.9 46 46  
12.0 52 52  
12.1 58 58  
12.2 76 76  
12.3 104 104

12.4 140 140  
12.5 186 186  
12.6 241 241  
12.7 305 305  
12.8 375 375  
13.0 509 509  
13.2 601 601  
13.4 674P 674P

13.6 628 628  
13.8 582 582  
14.0 518 518  
14.3 403 403  
14.6 320 320  
15.0 244 244  
15.5 180 180  
16.0 140 140

16.5 113 113  
17.0 95 95  
17.5 82 82  
18.0 73 73  
19.0 64 64  
20.0 55 55  
22.0 43 43  
26.0 9 9

P - Peak Flow

# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 10 years

----- Subareas -----

SHD  
Area(sq mi) 1.50  
Rainfall(in) 4.5  
Curve number 82  
Runoff(in) 2.61  
Tc (hrs) 2.00  
TimeToOutlet 0.00  
Ia/P 0.10  
(Used) 0.10

Time Total ----- Subarea Contribution to Total Flow (cfs) -----  
(hr) Flow SHD

11.0	27	27
11.3	35	35
11.6	47	47
11.9	63	63
12.0	70	70
12.1	82	82
12.2	106	106
12.3	141	141
12.4	192	192
12.5	251	251
12.6	321	321
12.7	407	407
12.8	497	497
13.0	669	669
13.2	787	787
13.4	885P	885P
13.6	814	814
13.8	756	756
14.0	669	669
14.3	517	517
14.6	411	411
15.0	309	309
15.5	227	227
16.0	176	176
16.5	141	141
17.0	117	117
17.5	102	102
18.0	90	90
19.0	78	78
20.0	67	67
22.0	51	51
26.0	12	12

P - Peak Flow



# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 25 years

	SHD	Subareas
Area(sq mi)	1.50	
Rainfall(in)	5.5	
Curve number	82	
Runoff(in)	3.54	
Tc (hrs)	2.00	
TimeToOutlet	0.00	
Ia/P	0.08	
(Used)	0.10	

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)
11.0	37	37
11.3	48	48
11.6	64	64
11.9	85	85
12.0	96	96
12.1	111	111
12.2	143	143
12.3	191	191
12.4	260	260
12.5	340	340
12.6	435	435
12.7	552	552
12.8	674	674
13.0	908	908
13.2	1067	1067
13.4	1200P	1200P
13.6	1104	1104
13.8	1025	1025
14.0	908	908
14.3	701	701
14.6	557	557
15.0	419	419
15.5	308	308
16.0	239	239
16.5	191	191
17.0	159	159
17.5	138	138
18.0	122	122
19.0	106	106
20.0	90	90
22.0	69	69
26.0	16	16

P - Peak Flow

# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake User: Doug  
 County : Lake State: IN Checked: \_\_\_\_\_  
 Subtitle: Wetland basin on Sleepy Hollow Ditch

Date: 08-04-98  
 Date: \_\_\_\_\_

# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake User: Doug  
 County : Lake State: IN Checked: \_\_\_\_\_  
 Subtitle: Wetland basin on Sleepy Hollow Ditch

Date: 08-04-98  
 Date: \_\_\_\_\_

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 50 years

----- Subareas -----

SHD  
 Area(sq mi) 1.50  
 Rainfall(in) 6.5  
 Curve number 82  
 Runoff(in) 4.41  
 Tc (hrs) 2.00  
 TimeToOutlet 0.00  
 Ia/P 0.07  
 (Used) 0.10

Time Total ----- Subarea Contribution to Total Flow (cfs) -----  
 (hr) Flow SHD

11.0	46	46
11.3	60	60
11.6	79	79
11.9	106	106
12.0	119	119
12.1	139	139
12.2	179	179
12.3	238	238

12.4	324	324
12.5	424	424
12.6	543	543
12.7	688	688
12.8	841	841
13.0	1132	1132
13.2	1330	1330
13.4	1496P	1496P

13.6	1377	1377
13.8	1277	1277
14.0	1132	1132
14.3	874	874
14.6	695	695
15.0	523	523
15.5	384	384
16.0	298	298

16.5	238	238
17.0	199	199
17.5	172	172
18.0	152	152
19.0	132	132
20.0	113	113
22.0	86	86
26.0	20	20

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: Doug

Date: 08-04-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Wetland basin on Sleepy Hollow Ditch

Total watershed area: 1.500 sq mi Rainfall type: II Frequency: 100 years

----- Subareas -----

SHD  
Area(sq mi) 1.50  
Rainfall(in) 7.6  
Curve number 82  
Runoff(in) 5.46  
Tc (hrs) 2.00  
TimeToOutlet 0.00  
Ia/P 0.06  
(Used) 0.10

Time Total ----- Subarea Contribution to Total Flow (cfs) -----  
(hr) Flow SHD

11.0	57	57
11.3	74	74
11.6	98	98
11.9	131	131
12.0	147	147
12.1	172	172
12.2	221	221
12.3	295	295

12.4	401	401
12.5	524	524
12.6	672	672
12.7	852	852
12.8	1041	1041
13.0	1401	1401
13.2	1647	1647
13.4	1852P	1852P

13.6	1704	1704
13.8	1581	1581
14.0	1401	1401
14.3	1081	1081
14.6	860	860
15.0	647	647
15.5	475	475
16.0	369	369

16.5	295	295
17.0	246	246
17.5	213	213
18.0	188	188
19.0	164	164
20.0	139	139
22.0	107	107
26.0	25	25

P - Peak Flow

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi    Rainfall type: II    Frequency: 01 years

		Subareas				
		1	1a	2	3	4
Area(sq mi)		0.71	0.71	0.25	0.32	0.19
Rainfall(in)		2.5	2.5	2.5	2.5	2.5
Curve number		82	82	81	81	80
Runoff(in)		1.01	1.01	0.95	0.95	0.90
Tc (hrs)		2.00	2.00	0.53	2.00	0.20
(Used)		2.00	2.00	0.50	2.00	0.20
TimeToOutlet		0.76	0.57	0.22	0.08	0.00
(Used)		0.75	0.50	0.30	0.10	0.00
Ia/P		0.17	0.17	0.19	0.19	0.20

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		1	1a	2	3	4
11.0	9	2	2	2	1	2
11.3	13	3	3	2	2	3
11.6	16	3	4	3	2	4
11.9	36	4	4	5	2	21
12.0	67	4	5	6	2	50
12.1	131	5	6	8	3	109
12.2	155	6	6	13	3	127P
12.3	125	6	7	24	5	83
12.4	109	6	9	43	6	45
12.5	125	8	11	66	9	31
12.6	145	10	14	85	12	24
12.7	163	13	19	94P	17	20
12.8	172	17	26	90	22	17
13.0	191	30	45	67	35	14
13.2	225	50	71	45	47	12
13.4	270	74	99	31	55	11
13.6	313	99	121	23	60P	10
13.8	341	119	136	18	59	9
14.0	346P	131P	138P	15	54	8
14.3	323	131	127	13	45	7
14.6	277	117	106	11	36	7
15.0	215	91	80	10	28	6
15.5	160	66	58	9	21	6
16.0	122	49	44	8	16	5
16.5	96	38	34	7	13	4
17.0	81	31	29	6	11	4
17.5	70	26	24	6	10	4
18.0	62	23	21	5	9	4
19.0	52	19	18	5	7	3
20.0	44	16	15	4	6	3
22.0	35	12	12	3	5	3
26.0	12	6	4	0	2	0

P - Peak Flow

# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 02 years

	Subareas				
	1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19
Rainfall(in)	3.0	3.0	3.0	3.0	3.0
Curve number	82	82	81	81	80
Runoff(in)	1.41	1.41	1.34	1.34	1.28
Tc (hrs)	2.00	2.00	0.53	2.00	0.20
(Used)	2.00	2.00	0.50	2.00	0.20
TimeToOutlet	0.76	0.57	0.22	0.08	0.00
(Used)	0.75	0.50	0.30	0.10	0.00
Ia/P	0.14	0.14	0.15	0.15	0.16

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		1	1a	2	3	4
11.0	16	3	4	3	2	4
11.3	22	5	5	4	3	5
11.6	28	5	6	6	3	8
11.9	64	7	8	8	4	37
12.0	113	8	9	10	5	81
12.1	202	9	10	14	5	164
12.2	236	9	11	23	6	187P
12.3	190	10	12	42	8	118
12.4	172	12	14	72	11	63
12.5	195	14	18	105	15	43
12.6	224	17	23	130	20	34
12.7	244	21	31	138P	27	27
12.8	256	28	41	129	35	23
13.0	282	48	69	93	53	19
13.2	333	78	107	61	71	16
13.4	398	114	146	41	82	15
13.6	458	149	178	30	88P	13
13.8	495	177	197	24	85	12
14.0	502P	191P	200P	21	79	11
14.3	460	188	181	17	64	10
14.6	389	165	149	15	51	9
15.0	299	127	112	13	39	8
15.5	217	90	79	12	28	8
16.0	165	66	60	10	22	7
16.5	131	51	47	9	18	6
17.0	109	41	39	8	15	6
17.5	94	35	33	8	13	5
18.0	82	30	28	7	12	5
19.0	68	24	23	6	10	5
20.0	58	20	20	6	8	4
22.0	46	16	16	5	6	3
26.0	15	7	6	0	2	0

P - Peak Flow

# TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 05 years

		Subareas				
		1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19	
Rainfall(in)	3.8	3.8	3.8	3.8	3.8	
Curve number	82	82	81	81	80	
Runoff(in)	2.03	2.03	1.95	1.95	1.88	
Tc (hrs)	2.00	2.00	0.53	2.00	0.20	
(Used)	2.00	2.00	0.50	2.00	0.20	
TimeToOutlet	0.76	0.57	0.22	0.08	0.00	
(Used)	0.75	0.50	0.30	0.10	0.00	
Ia/P	0.12	0.12	0.12	0.12	0.13	
Time (hr)	Total Flow	1	1a	2	3	4
11.0	28	6	7	5	3	7
11.3	39	9	9	8	4	9
11.6	49	9	10	10	6	14
11.9	113	12	13	15	8	65
12.0	184	13	14	18	8	131
12.1	318	14	17	25	9	253
12.2	367	16	19	41	11	280P
12.3	299	17	22	73	14	173
12.4	276	20	25	121	19	91
12.5	309	25	29	170	24	61
12.6	350	29	38	203	33	47
12.7	376	36	51	208P	43	38
12.8	392	48	66	191	55	32
13.0	428	79	108	132	83	26
13.2	507	126	165	85	108	23
13.4	602	179	222	57	124	20
13.6	692	230	268	42	133P	19
13.8	738	268	294	33	126	17
14.0	741P	286P	296P	28	116	15
14.3	670	277	264	23	93	13
14.6	563	240	217	20	74	12
15.0	426	182	160	17	56	11
15.5	306	127	113	16	40	10
16.0	230	92	84	14	31	9
16.5	181	71	65	12	25	8
17.0	149	56	53	11	21	8
17.5	128	48	45	10	18	7
18.0	112	40	39	10	16	7
19.0	93	33	32	9	13	6
20.0	78	27	27	8	11	5
22.0	64	22	22	6	9	5
26.0	19	9	7	0	3	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 10 years

	Subareas				
	1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19
Rainfall(in)	4.5	4.5	4.5	4.5	4.5
Curve number	82	82	81	81	80
Runoff(in)	2.61	2.61	2.52	2.52	2.44
Tc (hrs)	2.00	2.00	0.53	2.00	0.20
(Used)	2.00	2.00	0.50	2.00	0.20
TimeToOutlet	0.76	0.57	0.22	0.08	0.00
(Used)	0.75	0.50	0.30	0.10	0.00
Ia/P	0.10	0.10	0.10	0.10	0.11
(Used)	0.10	0.10	0.10	0.10	0.11

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		1	1a	2	3	4
11.0	39	7	9	8	5	10
11.3	52	11	11	11	6	13
11.6	70	13	15	14	8	20
11.9	160	17	19	21	11	92
12.0	258	19	20	26	12	181
12.1	430	20	24	36	14	336
12.2	490	22	26	59	16	367P
12.3	399	24	30	103	19	223
12.4	373	28	33	169	26	117
12.5	418	33	41	232	34	78
12.6	471	41	52	273	45	60
12.7	501	50	69	275P	59	48
12.8	516	65	89	247	75	40
13.0	563	107	145	167	111	33
13.2	667	169	219	106	144	29
13.4	792	239	293	71	164	25
13.6	906	304	352	52	175P	23
13.8	966P	354	385P	41	165	21
14.0	965	374P	385	35	152	19
14.3	869	359	343	29	121	17
14.6	725	309	280	25	95	16
15.0	544	232	206	21	71	14
15.5	387	161	143	19	51	13
16.0	291	117	106	17	39	12
16.5	227	89	82	15	31	10
17.0	187	70	67	14	26	10
17.5	158	59	56	12	22	9
18.0	138	50	48	12	19	9
19.0	114	41	39	11	16	7
20.0	95	33	33	9	14	6
22.0	75	26	26	7	10	6
26.0	23	11	9	0	3	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 25 years

	Subareas				
	1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19
Rainfall(in)	5.5	5.5	5.5	5.5	5.5
Curve number	82	82	81	81	80
Runoff(in)	3.54	3.54	3.44	3.44	3.34
Tc (hrs)	2.00	2.00	0.53	2.00	0.20
(Used)	2.00	2.00	0.50	2.00	0.20
TimeToOutlet	0.76	0.57	0.22	0.08	0.00
(Used)	0.75	0.50	0.30	0.10	0.00
Ia/P	0.08	0.08	0.09	0.09	0.09
(Used)	0.10	0.10	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		1	1a	2	3	4
11.0	56	10	13	11	7	15
11.3	74	15	15	15	9	20
11.6	99	18	20	20	11	30
11.9	225	23	25	29	15	133
12.0	362	25	28	36	17	256
12.1	600	28	33	51	19	469
12.2	677	30	35	82	22	508P
12.3	549	33	40	143	28	305
12.4	512	38	45	234	36	159
12.5	574	45	55	322	47	105
12.6	645	55	70	376	63	81
12.7	685	68	93	378P	81	65
12.8	705	88	121	338	103	55
13.0	767	146	196	228	153	44
13.2	905	229	296	144	197	39
13.4	1076	324	397	96	225	34
13.6	1230	412	477	70	240P	31
13.8	1313P	480	523P	56	226	28
14.0	1310	508P	523	47	207	25
14.3	1178	487	465	39	165	22
14.6	984	420	379	34	130	21
15.0	738	314	279	29	97	19
15.5	524	219	193	26	69	17
16.0	392	158	143	23	53	15
16.5	307	121	111	20	42	13
17.0	252	95	90	19	35	13
17.5	214	80	75	17	30	12
18.0	186	68	65	16	26	11
19.0	154	55	53	14	22	10
20.0	130	45	45	13	19	8
22.0	102	35	35	10	14	8
26.0	32	15	13	0	4	0

P - Peak Flow



TABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 50 years

	Subareas				
	1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19
Rainfall(in)	6.5	6.5	6.5	6.5	6.5
Curve number	82	82	81	81	80
Runoff(in)	4.41	4.41	4.31	4.31	4.20
Tc (hrs)	2.00	2.00	0.53	2.00	0.20
(Used)	2.00	2.00	0.50	2.00	0.20
TimeToOutlet	0.76	0.57	0.22	0.08	0.00
(Used)	0.75	0.50	0.30	0.10	0.00
Ia/P	0.07	0.07	0.07	0.07	0.08
(Used)	0.10	0.10	0.10	0.10	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs)				
		1	1a	2	3	4
11.0	69	13	16	14	8	18
11.3	93	19	19	19	11	25
11.6	123	22	25	25	14	37
11.9	282	28	31	37	19	167
12.0	452	31	34	45	21	321
12.1	751	34	41	63	23	590
12.2	850	38	44	102	28	638P
12.3	688	41	50	179	34	384
12.4	640	47	56	293	45	199
12.5	719	56	69	403	59	132
12.6	808	69	88	470	79	102
12.7	857	85	116	473P	102	81
12.8	882	110	150	423	130	69
13.0	958	182	244	285	191	56
13.2	1131	285	370	180	247	49
13.4	1343	404	495	120	281	43
13.6	1536	514	595	88	300P	39
13.8	1637P	598	652P	70	282	35
14.0	1635	633P	652	59	259	32
14.3	1472	608	580	49	207	28
14.6	1227	523	473	42	163	26
15.0	921	392	348	36	121	24
15.5	656	273	241	33	87	22
16.0	489	197	179	28	66	19
16.5	382	150	138	25	52	17
17.0	315	119	113	23	44	16
17.5	267	100	94	21	37	15
18.0	233	85	81	20	33	14
19.0	194	69	66	18	28	13
20.0	161	56	56	16	23	10
22.0	129	44	44	13	18	10
26.0	41	19	16	0	6	0

P - Peak Flow

ABULAR HYDROGRAPH METHOD

Version 2.00

Project : Cedar Lake

User: doug

Date: 08-11-98

County : Lake

State: IN

Checked: \_\_\_\_\_

Date: \_\_\_\_\_

Subtitle: Alum Basin at Inlet of Sleepy Hollow Ditch into Cedar Lake

Total watershed area: 2.175 sq mi Rainfall type: II Frequency: 100 years

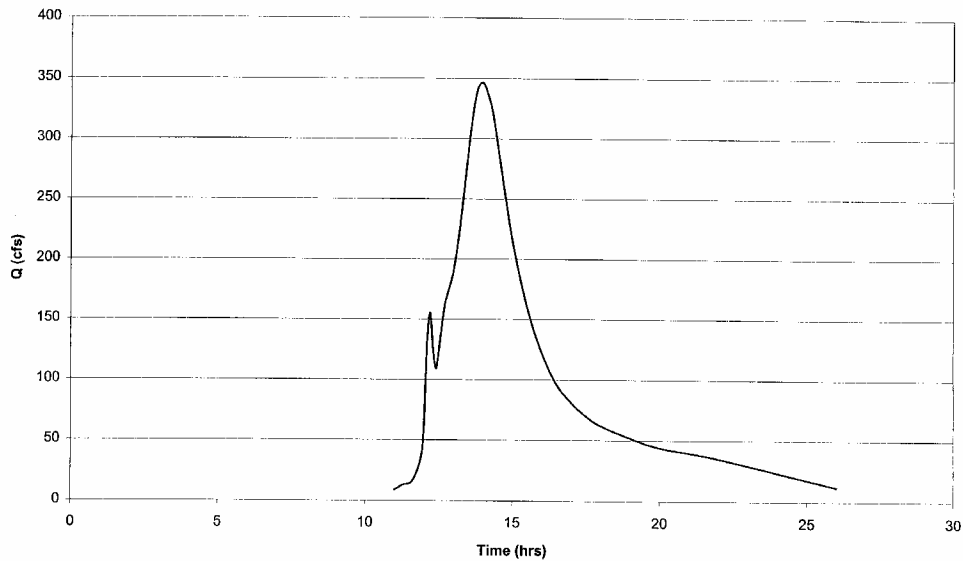
	----- Subareas -----				
	1	1a	2	3	4
Area(sq mi)	0.71	0.71	0.25	0.32	0.19
Rainfall(in)	7.6	7.6	7.6	7.6	7.6
Curve number	82	82	81	81	80
Runoff(in)	5.46	5.46	5.35	5.35	5.23
Tc (hrs)	2.00	2.00	0.53	2.00	0.20
(Used)	2.00	2.00	0.50	2.00	0.20
TimeToOutlet	0.76	0.57	0.22	0.08	0.00
(Used)	0.75	0.50	0.30	0.10	0.00
Ia/P	0.06	0.06	0.06	0.06	0.07
(Used)	0.10	0.10	0.10	0.10	0.10

Time	Total	----- Subarea Contribution to Total Flow (cfs) -----				
(hr)	Flow	1	1a	2	3	4
11.0	85	16	19	17	10	23
11.3	115	23	23	24	14	31
11.6	153	27	31	31	17	47
11.9	352	35	39	46	24	208
12.0	565	39	43	56	26	401
12.1	936	43	50	79	29	735
12.2	1057	47	54	127	34	795P
12.3	856	50	62	223	43	478
12.4	797	58	70	364	56	249
12.5	894	70	85	500	74	165
12.6	1003	85	109	584	98	127
12.7	1063	105	143	587P	127	101
12.8	1093	136	186	525	161	85
13.0	1189	225	302	354	238	70
13.2	1402	353	458	224	306	61
13.4	1665	500	613	149	349	54
13.6	1904	636	737	109	373P	49
13.8	2029P	741	807P	86	351	44

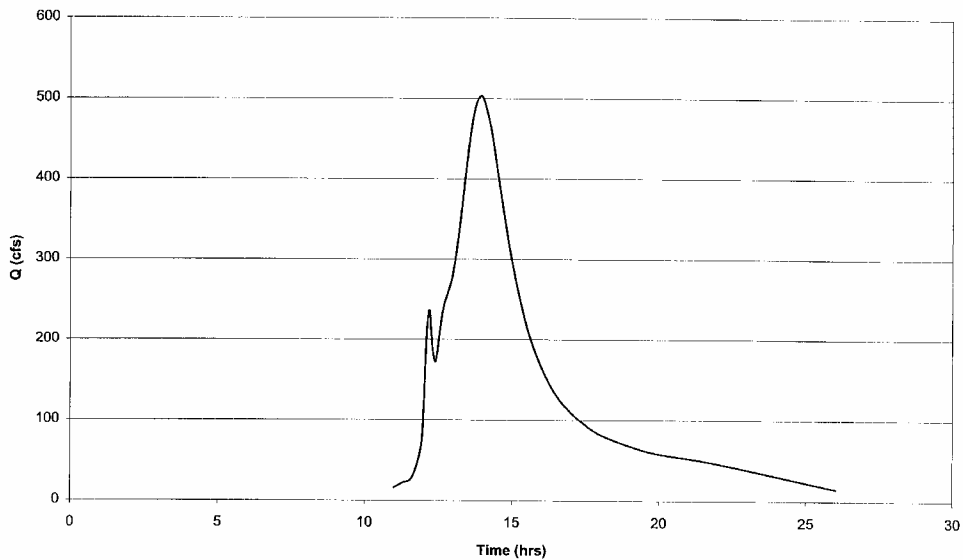
14.0	2025	783P	807	73	322	40
14.3	1821	752	717	60	257	35
14.6	1521	648	586	52	202	33
15.0	1141	485	430	45	151	30
15.5	812	337	299	41	108	27
16.0	606	244	221	35	82	24
16.5	474	186	171	31	65	21
17.0	391	147	140	29	55	20
17.5	331	124	116	26	46	19
18.0	290	105	101	25	41	18
19.0	238	85	81	22	34	16
20.0	202	70	70	20	29	13
22.0	158	54	54	16	22	12
26.0	49	23	19	0	7	0

P - Peak Flow

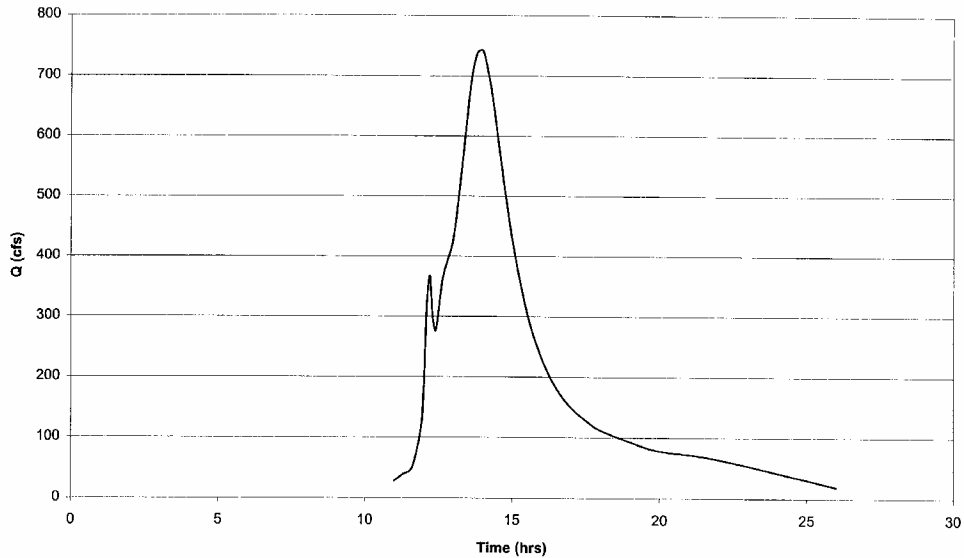
**Inlet Hydrograph for a 1 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**



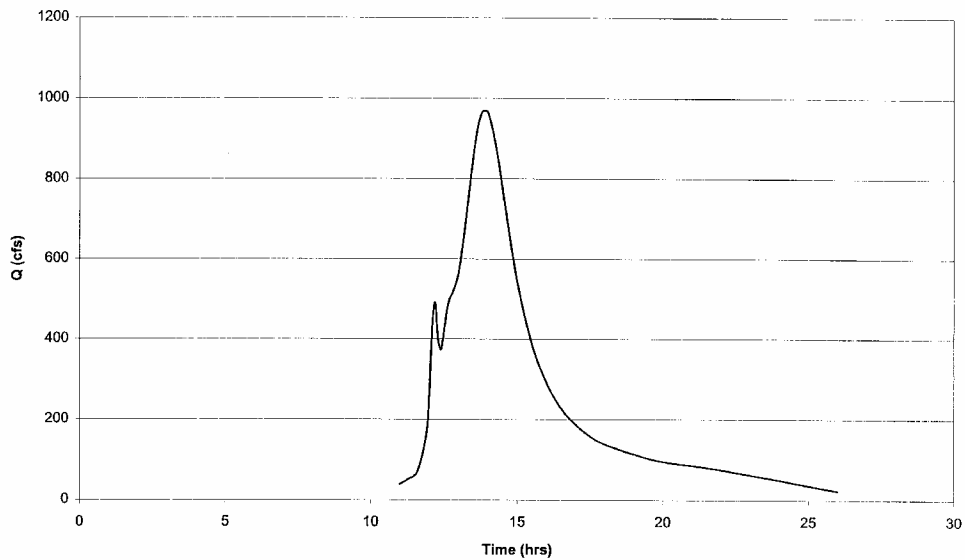
**Inlet Hydrograph for a 2 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**



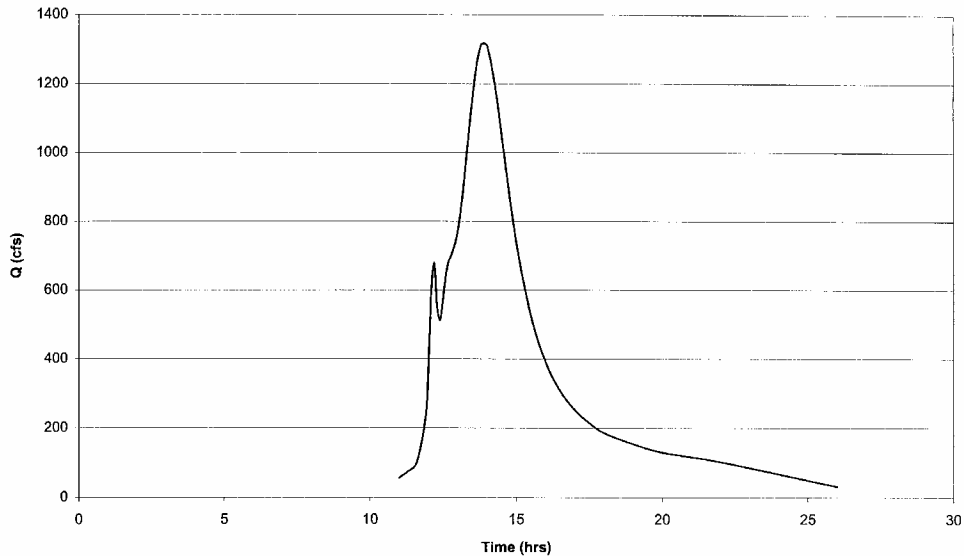
**Inlet Hydrograph of a 5 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**



**Inlet Hydrograph of 10 Year, 24-hour Storm  
for the Proposed Alum Treatment System**

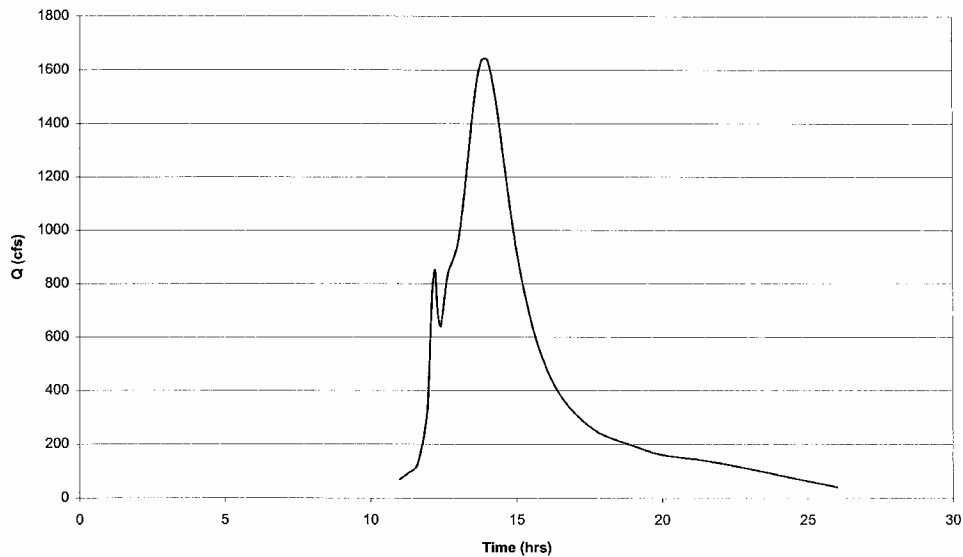


**Inlet Hydrograph of 25 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**

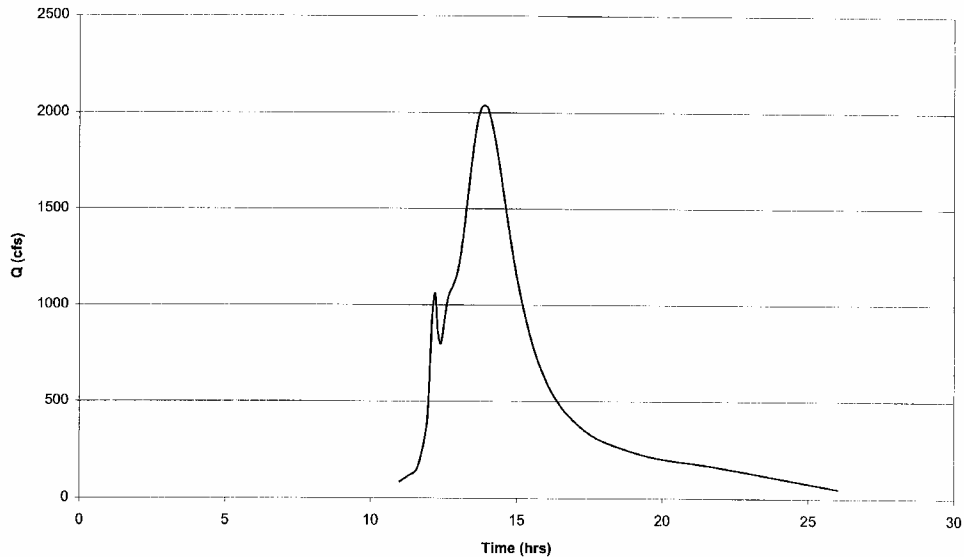




**Inlet Hydrograph of a 50 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**

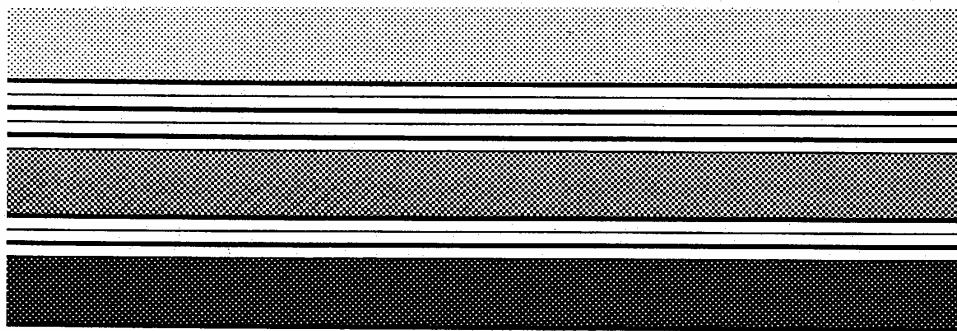


**Inlet Hydrograph of a 100 Year, 24-Hour Storm  
for the Proposed Alum Treatment System**



APPENDIX 4

# SAMPLE PERMIT APPLICATIONS





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## **Indiana Department of Environmental Management Section 401 Water Quality Certification Program**

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# **Application Form and Instructions for Section 401 Water Quality Certification**



*Revised October 27, 1997*

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# INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

*We make Indiana a cleaner, healthier place to live*

Frank O'Bannon  
Governor

John M. Hamilton  
Commissioner

100 North Senate Avenue  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015  
Telephone 317-232-8603  
Environmental Helpline 1-800-451-6027

Dear Section 401 Water Quality Certification Applicants:

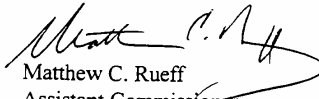
Thank you for doing your part to ensure that we are all good stewards of Indiana's lakes, rivers, streams, and wetlands. We at the Indiana Department of Environmental Management (IDEM) are committed to protecting the integrity of our State's precious aquatic resources.

Section 404 of the Clean Water Act (CWA) requires anyone wishing to discharge dredged or fill material into a water of the United States to first receive a permit from the U.S. Army Corps of Engineers (Corps). Before the Corps can issue a permit, however, Section 401 of the CWA requires the applicant to obtain a Water Quality Certification (or waiver) for the project from the State in which the project is located.

IDEM's goal is to preserve, protect, and enhance the quality of Indiana's aquatic resources. We want to work with you to find sound ecological solutions that meet your project needs. We have developed an application packet that sets forth the information we need from you to make a decision regarding your project. We believe it is relatively simple to complete.

Please contact us with any questions or concerns you may have. You can reach us at 317-232-8683 or you may reach us through the IDEM Environmental Helpline at 1-800-451-6027. Thank you again for doing your part to ensure that Indiana's aquatic resources are protected for future generations of Hoosiers.

Sincerely,

  
Matthew C. Rueff  
Assistant Commissioner  
Office of Water Management

## FREQUENTLY ASKED QUESTIONS REGARDING WATER QUALITY CERTIFICATION (WQC)

1. Who needs a WQC?

Any applicant for a federal license or permit to conduct any activity that may result in a discharge into waters of the United States must first obtain a WQC (or waiver) from the state. In general, anyone who is required to obtain a permit from the U.S. Army Corps of Engineers to engage in dredging, excavation or filling activities must obtain a WQC.

2. What is a water of the United States?

Very few waterbodies are not waters of the United States. Waters of the United States include: waters that are or have been used to transport commerce and their tributaries; all interstate waters; and all intrastate waters the use, degradation or destruction of which could affect commerce. This generally includes lakes, rivers, streams, creeks, drainage ditches and wetlands. The Corps can tell you whether the particular waterbody you plan on impacting is a water of the United States.

3. What type of project may require a WQC and Corps permit?

The Corps has the authority to decide which projects require a permit and whether they will qualify for a Nationwide Permit, General Permit, or Individual Permit. The addresses and telephone numbers for the two Corps Districts that have jurisdiction in Indiana are included at the back of this packet. The following are examples of projects that would likely require a Corps permit and WQC: dredging a lake, river, stream, or wetland; filling a lake, river, stream, or wetland; bank stabilization; pond construction in wetlands; and roadway/bridge construction projects involving water crossings.

4. If my project qualifies for a Nationwide Permit from the Corps, do I still need a WQC?

IDEM has given a blanket WQC for some, but not all, of the Nationwide Permits (NWP) established by the Corps. If IDEM has not given a blanket WQC for the particular NWP the Corps has authorized you to work under, then an individual WQC from IDEM will be necessary. The Corps will inform you if your project needs an individual WQC. You may also request a list of the NWPs for which IDEM has granted blanket certification and NWPs that IDEM has certified with special conditions.

5. How long will it take me to obtain a WQC?

If IDEM receives all the necessary information, then IDEM can usually make a decision on your application within sixty days of receiving it. However, the Clean Water Act authorizes IDEM to take up to a year to make a decision on your application.

6. Is there an application fee for obtaining a WQC?

Currently, there are no fees required for applying for a WQC.

## Instructions for Completing the Application for Water Quality Certification

- \* The numbers below correspond to the numbers on the application form
- \* If you have questions, please call IDEM's Water Quality Certification Program at 1-800-451-6027 or 317-232-8683
- \* Print clearly or type
- \* Attach additional 8 1/2 x 11" sheets if necessary

1. Provide the applicant's name, address, and telephone number.
2. Provide the agent's address and telephone information (an agent is anyone representing the applicant on the project, such as an attorney or consultant). Applicants are not required to have an agent.
3. Provide specific project information relating to the location and the proposed project.
4. Give a narrative description of the proposed project.
5. Describe the purpose of the project (i.e., why the project is being proposed).
6. Provide the proposed or actual start date and the anticipated completion date. If you have started your project before obtaining a permit and WQC, you may be in violation of federal and state law.
7. Describe possible alternatives to the proposed project that would avoid impacts to the aquatic resource; also describe ways to minimize impacts, including a description of how you plan on containing any dredged/excavated material to prevent reentry into waterways or wetland. If you can avoid impacts to the aquatic resource, you may be able to avoid the requirement to obtain a WQC. Alternatives may include: construction on the upland portions of the property; rerouting a roadway to avoid a wetland; or alternate design plans. Minimization of the impacts may decrease any mitigation requirements that might otherwise apply and increase the chances of receiving WQC. Minimization may include reduction of the amount of dredging, filling, or vegetative clearing.
8. If you are proposing to dredge, identify any pollutants that may be present in the sediment. IDEM will contact you if further information is needed.

**Instructions are continued immediately after the pull out application**



## Application for Water Quality Certification

Address all applications or questions to:

**Indiana Department of Environmental Management**  
**Section 401 Water Quality Certification Program**  
100 North Senate Avenue P.O. Box 6015 Indianapolis, Indiana 46206-6015  
1-800-451-6027 or 317-232-8683

**PLEASE PULL OUT APPLICATION FROM PACKET**

**Failure to provide the information requested in this application may  
result in a delay of processing or denial of your application.**

For office use only
Project Manager:
Date Received:
IDEM I.D. Number:
County:



1. APPLICANT INFORMATION			
Name of Applicant			Mailing Address (Street, P.O. Box or Rural Route)
City	State	Zip	
Daytime Telephone Number			Fax Number

2. AGENT INFORMATION			
Name of Agent			Mailing Address (Street, P.O. Box or Rural Route)
City	State	Zip	
Daytime Telephone Number			Fax Number

3. PROJECT INFORMATION	
County project is located in	Nearest Town
Project Name or Title (if applicable)	Project Street Address
Type of aquatic resource to be impacted	Name of waterbody
Linear feet of bank/shoreline impact (if applicable)	Acreage of wetland proposed to be impacted (if applicable)
Acreage of wetlands on site	Cowardin Classification (if known)

4. Describe proposed project:

--

5. Purpose of the project:

6. Date project will begin if permit is issued: \_\_\_\_\_ If work has been started, date it was started: \_\_\_\_\_

Anticipated completion date: \_\_\_\_\_

7. Describe possible alternatives to the proposed project to avoid or minimize impacts to the aquatic resource. Also describe where and how you plan on putting and containing the dredged/excavated material (if any) to prevent reentry into the aquatic resource.

8. Do you expect to dredge any sediments that you know, or have reason to believe, are contaminated with pollutants?

\_\_\_\_ Yes \_\_\_\_ No Please identify the pollutants that may be present in the sediment.

9. Are you aware of any unique resources (e.g., mussels) or threatened or endangered (state or federal) species present in the aquatic resource you are proposing to impact? \_\_\_\_ Yes \_\_\_\_ No Please identify.

10. If fill is to be placed, describe the type, composition and quantity:

11. Have you applied for an Army Corps of Engineers Section 404 permit? ☐ Yes ☐ No If yes, please supply the Corps of Engineers ID Number, the Corps of Engineers District, the project manager, and a copy of any correspondence with the Corps. If no, please contact the Army Corps of Engineers regarding the possible need for a permit application. (See instructions 11.)

12. Have you applied for, received, or been denied any other federal, state, or local permits, variances, licenses, or certifications for this project? Please give the permit name, agency from which it was obtained, permit number, and date of issuance or denial.

13. Please attach the following information:

- ☐ A. List of adjacent landowners and persons who may be adversely affected by the project (Attachment A).
- ☐ B. A standard size drawing (8.5"x11") of the proposed activity showing an overhead view and cross section that clearly illustrate the scale, north arrow, **wetland delineation** (and data sheets if required by the Corps -- see instructions), erosion control devices, existing and proposed structures and their dimensions, water depths and bottom configurations (if applicable), existing and proposed waterway configurations and elevations, dredge cuts and fills, and ordinary high water mark.
- ☐ C. Photographs of the proposed project site; label the photos and identify the location(s) where the photographs were taken on the drawing.
- ☐ D. If proposed, a mitigation plan to minimize impacts to water quality including the restoration or creation of wetlands to replace the wetlands that will be lost as a result of the proposed project.
- ☐ E. Directions to the project location and a copy of a vicinity map and/or a copy of the portion of the U.S.G.S. 7.5 minute topographic map clearly showing the project location.

I hereby request a Water Quality Certification to authorize the activities described in this application. I certify that I am familiar with the information contained in this application and to the best of my knowledge and belief, such information is true and accurate. I certify that I have the authority to undertake and will undertake the activities as described in this application. I am aware that there are penalties for submitting false information. I understand that any changes in project design subsequent to IDEM's granting of WQC are not covered by the WQC, and I may be subject to civil and criminal penalties for proceeding without proper authorization. I agree to allow representatives of the IDEM to enter and inspect the project site. I understand that the granting of other permits by local, state, or federal agencies does not release me from the requirement of obtaining the WQC requested herein before commencing the project.

Applicant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

- 
9. Some aquatic resources may contain or be utilized by unique aquatic life (such as mussels) or threatened or endangered species. Please identify any such species.
  10. Describe the type, composition, and quantity of fill material to be placed in the wetlands or other aquatic resources.
  11. Provide information regarding your application to the U.S. Army Corps of Engineers. If you have not contacted the Corps of Engineers, please call the Louisville Corps District at 502/582-5607 or the Detroit Corps District at 313/226-6828. Please consult the map on the next page to determine which district your project is located in.
  12. Provide information regarding any other federal, state, or local permits, variances, licenses, or certifications required for your project. Please indicate whether they were approved, denied, or are pending.
  13. Provide the information specified on page 3 of the application (list of adjacent landowners and affected persons, drawings, photos, mitigation plan and map). Submit a copy of the wetland delineation and data sheets (done in accordance with the Corps' regulations) if the Corps' regulations require a delineation for the project. If a delineation is not required by the Corps, then the applicant may instead submit a drawing to scale showing the location and extent of the wetland.
  14. The applicant must sign and date the application.
  15. IDEM may need additional information from you, including an antidegradation demonstration. IDEM will contact you if we determine that is necessary.

For more information about WQC, contact IDEM at the address below. Please contact the Indiana Department of Natural Resources or respective Corps District at the proper address below for questions regarding their programs.

IDEM - Office of Water Management  
Section 401 Water Quality Certification Program  
P.O. Box 6015  
IGCN Room 1255  
Indianapolis, IN 46206-6015  
1-800-451-6027 or 317-232-8683

US Army Corps of Engineers  
Detroit District  
P.O. Box 1027  
Detroit, MI 48231-1027  
313-226-2218

Indiana Department of Natural Resources  
Division of Water  
402 W. Washington Street, Room W200  
Indianapolis, IN 46204  
317-232-4161

US Army Corps of Engineers  
Louisville District  
P.O. Box 59  
Louisville, KY 40201-0059  
502-582-5607

## ATTACHMENT A

**Please be sure to include this attachment with your application. Failure to include it may result in a delay of processing or denial of your application.**

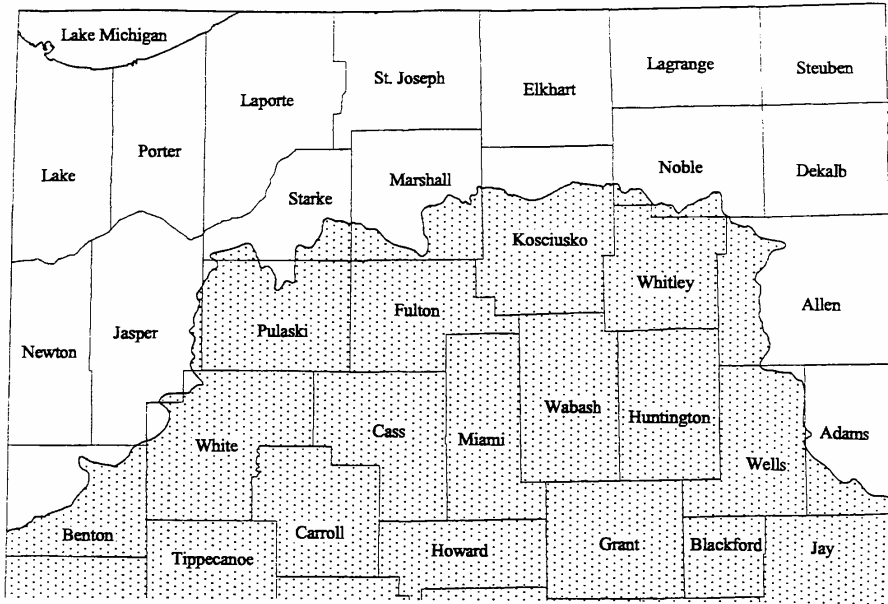
Adjacent landowners and other persons (or entities) who may be affected by your project need to be notified of your project. Please list the names and addresses of landowners adjacent to the property on which your project is located and the names and addresses of other persons (or entities) potentially affected by your project. Attach additional sheets if needed.

Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:
Name: Address:

Please provide the names and telephone numbers of the two largest newspapers of general circulation in the project area.

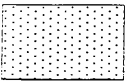
Newspaper name: Telephone number:
Newspaper name: Telephone number:

# U.S. Army Corps of Engineers District Map



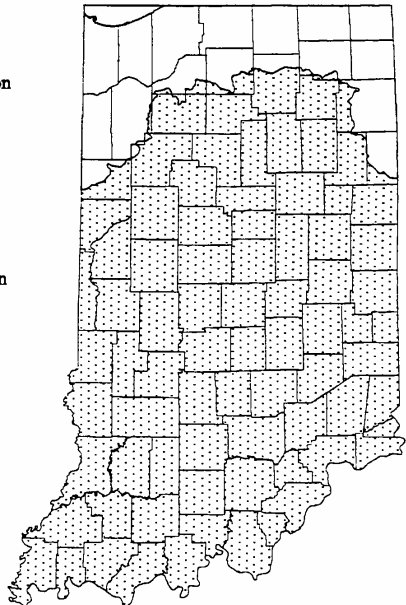
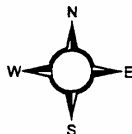
Counties or sections of counties within the jurisdiction of the Detroit District of the Corps of Engineers

Contact the Detroit Corps at - 313/226-2218



Counties or sections of counties within the jurisdiction of the Louisville District of the Corps of Engineers

Contact the Louisville Corps at - 502/582-5607



**Indiana Department of Environmental Management  
Section 401 Water Quality Certification Program  
100 North Senate Avenue  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015**

**APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT**  
(33 CFR 325)

OMB APPROVAL NO. 0710-003  
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

**PRIVACY ACT STATEMENT**

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

**(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)**

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
--------------------	----------------------	------------------	-------------------------------

**(ITEMS BELOW TO BE FILLED BY APPLICANT)**

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE <i>(an agent is not required)</i>
6. APPLICANT'S ADDRESS	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NOS. W/AREA CODE	10. AGENT'S PHONE NOS. W/AREA CODE
a. Residence	a. Residence
b. Business	b. Business

**11. STATEMENT OF AUTHORIZATION**

I hereby authorize, \_\_\_\_\_ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

\_\_\_\_\_  
APPLICANT'S SIGNATURE

\_\_\_\_\_  
DATE

**NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY**

12. PROJECT NAME OR TITLE *(see instructions)*

13. NAME OF WATERBODY, IF KNOWN *(if applicable)*

14. PROJECT STREET ADDRESS *(if applicable)*

15. LOCATION OF PROJECT

\_\_\_\_\_  
COUNTY

\_\_\_\_\_  
STATE

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, *(see instructions)*

17. DIRECTIONS TO THE SITE



---

18. Nature of Activity (Description of project, include all features)

---

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

---

**USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

---

20. Reason(s) for Discharge

---

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

---

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

---

23. Is Any Portion of the Work Already Complete? Yes ☐ No ☐ IF YES, DESCRIBE THE COMPLETED WORK

---

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

---

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
--------	----------------	-----------------------	--------------	---------------	-------------

\*Would include but is not restricted to zoning, building and flood plain permits

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26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

---

SIGNATURE OF APPLICANT

---

DATE

---

SIGNATURE OF AGENT

---

DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

**Instructions for Preparing a  
Department of the Army Permit Application**

**Blocks 1 through 4.** To be completed by Corps of Engineers.

**Block 5. Applicant's Name.** Enter the name of the responsible party or parties. If the responsible party is an agency, company, corporation or other organization, indicate the responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked **Block 5**.

**Block 6. Address of Applicant.** Please provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked **Block 6**.

**Block 7. Applicant Telephone Number(s).** Please provide the number where you can usually be reached during normal business hours.

**Blocks 8 through 11.** To be completed if you choose to have an agent.

**Block 8. Authorized Agent's Name and Title.** Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer or any other person or organization. *Note:* An agent is not required.

**Block 9 and 10. Agent's Address and Telephone number.** Please provide the complete mailing address of the agent, along with the telephone number where he/she can be reached during normal business hours.

**Block 11. Statement of Authorization.** To be completed by applicant if an agent is to be employed.

**Block 12. Proposed Project Name or Title.** Please provide name identifying the proposed project (i.e., Landmark Plaza, Burned Hills Subdivision or Edsall Commercial Center).

**Block 13. Name of Waterbody.** Please provide the name of any stream, lake, marsh or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

**Block 14. Proposed Project Street Address.** If the proposed project is located at a site having a street address (not a box number), please enter here.

**Block 15. Location of Proposed Project.** Enter the county and state where the proposed project is located. If more space is required, please attach a sheet with the necessary information marked **Block 15**.

**Block 16. Other Location Descriptions.** If available, provide the Section, Township and Range of the site and/or the latitude and longitude. You may also provide description of the proposed project location, such as lot numbers, tract numbers or you may choose to locate the proposed project site from a known point (such as the right descending bank of Smith Creek, one mile down from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site if known.

**Block 17. Directions to the Site.** Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site.

**Block 18. Nature of Activity.** Describe the overall activity or project. Give appropriate dimensions of structures such as wingwalls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles or float supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked **Block 18**.

**Block 19. Proposed project Purpose.** Describe the purpose and need for the proposed project. What will it be used for and why? Also include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

**Block 20. Reason(s) for Discharge.** If the activity involves the discharge of dredged and/or fill material into a wetland or other waterbody, including the temporary placement of material, explain the specific purpose of the placement of the material (such as erosion control).

**Block 21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards.** Describe the material to be discharged and amount of each material to be discharged within Corps jurisdiction. Please be sure this description will agree with your illustrations. Discharge material includes: rock, sand, clay, concrete, etc.

**Block 22. Surface Areas of Wetlands or Other Waters Filled.** Describe the area to be filled at each location. Specifically identify the surface areas, or part thereof, to be filled. Also include the means by which the discharge is to be done (backhoe, dragline, etc.). If dredged material is to be discharged on an upland site, identify the site and the steps to be taken (if necessary) to prevent runoff from the dredged material back into a waterbody. If more space is needed, attach an extra sheet of paper marked **Block 22**.

**Block 23. Is Any Portion of the Work Already Complete?** Provide any background on any part of the proposed project already completed. Describe the area already developed, structures completed, any dredged or fill material already discharged, the type of material, volume in cubic yards, areas filled, if a wetland or other waterbody (in acres or square feet). If the work was done under an existing Corps permit, identify the authorization if possible.

**Block 24. Names and Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Project Site.** List complete names and full mailing addresses of the adjacent property owners (public and private) lessees, etc., whose property adjoins the waterbody or aquatic site where the work is being proposed so that they may be notified of the proposed activity (usually by public notice). If more space is needed, attach an extra sheet of paper marked **Block 24**.

Information regarding adjacent landowners is usually available through the office of the tax assessor in the county of counties where the project is to be developed.

**Block 25. Information about Approvals or Denials by Other Agencies.** You may need the approval of other Federal, state or local agencies for your project. Identify any applications you have submitted and the status, if any (approved or denied) of each application. You need not have obtained all other permits before applying for a Corps permit.

**Block 26. Signature of Applicant or Agent.** The application must be signed by the owner or other authorized party (agent). This signature shall be an affirmation that the party applying for the permit possesses the requisite property rights to undertake the activity applied for (including compliance with special conditions, mitigation, etc.).

#### **DRAWINGS AND ILLUSTRATIONS**

##### **General Information.**

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a **Vicinity Map**, a **Plan View** or a **Typical Cross-Section Map**. Identify each illustration with a figure or attachment number.

Please submit one original, or good quality copy, of all drawings on 8 1/2x11 inch plain white paper (tracing paper or film may be substituted). Use the fewest number of sheets necessary for your drawings or illustrations.

Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross-section). **While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate and contain all necessary information.**

STATE OF INDIANA  
DEPARTMENT OF NATURAL RESOURCES

**JOINT PERMIT APPLICATION FOR CONSTRUCTION WITHIN A FLOODWAY OF A  
STREAM OR RIVER; NAVIGABLE WATERWAY; PUBLIC FRESH WATER LAKE; AND  
DITCH RECONSTRUCTION**

**\*\*\* INSTRUCTIONS \*\*\***

This joint application can be used to apply for: (1) alteration of the bed or shoreline of a public freshwater lake; (2) construction or reconstruction of any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within 1/2 mile of the lake; (3) construction within the floodway of any river or stream; (4) placing, filling, or erecting a permanent structure in; water withdrawal from; or material extraction from; a navigable waterway; (5) extraction of mineral resources from or under the bed of a navigable waterway; and (6) construction of an access channel. **You must submit readable copy of the completed application form together with items stated in the "Application Checklist" (attached).**

Use the following checklist to determine which permit(s) to apply for. If you have trouble deciding which permit(s) you need, please contact the Permit Administration Section at (317) 233-5635.

Your project may require one or more of the following permits. **IF YOU CHECK ANY BOX UNDER A PERMIT TITLE, THEN YOU MUST APPLY FOR THAT PERMIT.**

- ☐ IC 14-26-2: **Lake Preservation Act** states that no person may change the level of the water or shoreline of a public freshwater lake by excavating, filling in, or otherwise causing a change in the area or depth or affecting the natural resources scenic beauty or contour of the lake below the waterline or shoreline, without first securing the written approval of the Department of Natural Resources. A written permit from the Department is also required for construction of marinas; new seawall; seawall refacing; underwater beaches; boatwells; boat well fills; fish attractors; and any permanent structures within the waterline or shoreline of a public freshwater lake. The Act further states that **each permit application must be accompanied by a non-refundable \$25 fee.**
- ☐ IC 14-26-5: **Lowering of the Ten Acre Lake Act** also known as the "**Ditch**" Act states that no person may order or recommend the location, establishment, construction, reconstruction, repair, or recleaning any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of 10 acres or more and within 1/2 mile of the lake without first securing the written approval of the Department of Natural Resources. The Act further states that **each permit application must be accompanied by a non-refundable \$25 fee.**
- ☐ IC 14-28-1: **Flood Control Act** requires that any person proposing to construct a structure, place fill, or excavate material within the floodway of any river or stream must obtain the written approval of the Department of Natural Resources prior to initiating the activity. The Act further states that **each permit application must be accompanied by a non-refundable \$50 fee.**
- ☐ IC 14-29-1: **Navigable Waterways Act** requires that prior written approval be obtained from the Department of Natural Resources for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from; a navigable waterway or Lake Michigan. **No Fee**
- ☐ IC 14-29-3: **Sand and Gravel Permits Act** requires that prior written approval be obtained from the Department of Natural Resources for removal of sand, gravel, stone, or other mineral or substance from or under the bed of a navigable waterway. The Act further states that **each permit application must be accompanied by a non-refundable \$50 fee.**
- ☐ IC 14-29-4: **Construction of Channels Act** requires that prior written approval of the Department of Natural Resources be obtained for construction of an artificial; or the improved channel of a natural watercourse; connecting to any river or stream for the purpose of providing access by boat or otherwise to public or private industrial, commercial, housing, recreational, or other facilities. **Each permit application must be accompanied by a non-refundable \$100 fee.**

**PUBLIC NOTICE**

Adjacent Property Owner's Name  
 Address  
 City, State, Zip Code

Date \_\_\_\_\_

Indiana Code 14-11-4 was enacted to ensure that adjacent property owners are notified of permit applications and provided with an opportunity to present their views to the Department of Natural Resources prior to action.

Under this legislation, the applicant or agent is responsible for providing notice to the owner of the real property owned by a person, other than the applicant, which is both of the following: 1.) located within one-fourth ( $\frac{1}{4}$ ) mile of the site where the licensed activity would take place, and 2.) has a border or point in common with the exterior boundary of the property where the licensed activity would take place. Included is property which would share a common border if not for the separation caused by a roadway, stream, channel, right-of-way, easement, or railroad.

Due to your proximity to the project site, you are considered to be an adjacent property owner; therefore, notice is being provide in conformance with the provisions of IC 14-11-4 and 310 IAC 0.6.

Applicant's Name, Address, and Telephone

Agent's Name, Address, and Telephone

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Stream or Lake Name \_\_\_\_\_

Project Description and Location \_\_\_\_\_

Check relevant Statute or Rule:

- ☐ Flood Control Act, IC 14-28-1  
☐ Lake Preservation Act, IC 14-26-2  
☐ "Ditch Act", IC 14-26-5  
☐ Channels Act, IC 14-29-4  
☐ Removal of Sand or Gravel, IC 14-29-3

Questions relating to the project should be directed to:

Applicant (or Agent) Name  
 Mailing Address  
 City, State, Zip Code  
 Telephone Number

\_\_\_\_\_

You may request an informal public hearing, pre-AOPA (Administrative Orders and Procedures Act) hearing, on this application by filing a petition with the Division of Water. The petition must conform to administrative rule 310 IAC 0.6-3-2.3 as follows:

- (a) This section establishes the requirements for a petition to request a public hearing under IC 14-11-4-8(a)(2).
- (b) The petition shall include the signatures of a least twenty-five (25) individuals who are at least eighteen (18) years of age and who reside in the county where the licensed activity would take place or who own real property within one (1) mile of the site of the proposed or existing licensed activity.

- (c) The complete mailing addresses of the petitioners shall be typed or printed legibly on the petition.
- (d) Each individual who signs the petition shall affirm that the individual qualifies under subsection (b).
- (e) The petition shall identify the application for which a public hearing is sought, either by application number or by the name of the applicant and the location of the project.

A pre-AOPA public hearing on the application will be limited to the Department's authority under the permitting statutes. Only the issues relevant to the Department's jurisdiction directly related to this application for construction will be addressed. Under permitting statutes, the Department has no authority in zoning, local drainage, burning, traffic safety, etc.; therefore, topics beyond the Department's jurisdiction will not be discussed during the public hearing.

You may also request that the Department notify you in writing when an initial determination is made to issue or deny the permit. Following the receipt of the post action notice, you may request administrative review of the determination by the Natural Resources Commission under IC 14-21.5 and 310 IAC 0.6.

A request for a pre-AOPA public hearing or notice of initial determination should be addressed to:

Permit Administration Section  
Division of Water  
Department of Natural Resources  
402 West Washington Street, Room W264  
Indianapolis, Indiana 46204-2748  
Telephone: (317) 233-5635

The Department's jurisdiction under the Flood Control Act is confined to the floodway of the stream and its review limited to the following criteria.

To be approvable a project must demonstrate that it will:

- (a) not adversely affect the efficiency or unduly restrict the capacity of the floodway; defined as, the project will not result in an increase in flood stages of more than 0.14 feet above the base 100-year regulatory flood elevation;
  - (b) not constitute an unreasonable hazard to the safety of life or property; defined as, the project will not result in either of the following during the regulatory flood: (1) the loss of human life, (2) damage to public or private property to which the applicant has neither ownership nor a flood easement;
  - (c) not result in unreasonably detrimental effects upon fish, wildlife or botanical resources.
- Additionally, the Department must consider the cumulative effects of the above items.

The Department's jurisdiction under the Lakes Preservation Act is confined to the area at or lakeward of the shoreline of the lake and any impact which the project may have on:

- (a) the natural resources and/or scenic beauty of the lake;
- (b) the water level or contour of the lake below the waterline;
- (c) fish, wildlife or botanical resources.

Additionally, the Department must consider the cumulative effects of the above items.

**Indiana Department of Environmental Management**  
**Notice of Intent (NOI)**  
 Storm Water Runoff Associated with Construction Activity  
 NPDES General Permit Rule 327 IAC 15-5 (Rule 5)

Submission of this Notice of Intent letter constitutes notice that the operator is applying for coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit Rule for Storm Water Discharges Associated with Construction Activity (see 327 IAC 15-2-5 (c) for definition of operator). Permitted operators are required to comply with all terms and conditions of the General Permit Rule 327 IAC 15-5 (Rule 5).

**Construction Project:**

Name: \_\_\_\_\_ County: \_\_\_\_\_  
 SIC Code or Description of Project: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Operator Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Company Name: \_\_\_\_\_  
 Complete Address: \_\_\_\_\_  
 Contact Person (if different from above): \_\_\_\_\_  
 Complete Address (if different from above): \_\_\_\_\_  
 \_\_\_\_\_ Phone: \_\_\_\_\_  
 Affiliation with operator: \_\_\_\_\_

**Ownership Status:** (check one)

Federal \_\_\_\_\_ State \_\_\_\_\_ Public (other than Federal or State) \_\_\_\_\_  
 Private \_\_\_\_\_ Other \_\_\_\_\_

**Location:**

Latitude & Longitude \_\_\_\_\_ Or Quarter \_\_\_\_\_ Section \_\_\_\_\_  
 \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_

**Name of Receiving Water**

(and if applicable, name of municipal operator of storm sewer): \_\_\_\_\_

Please note: Even if a retention pond is present on the property, the name of the nearest possible receiving water is required.

**Acreage:** Total acreage: \_\_\_\_\_ Acreage to be Disturbed: \_\_\_\_\_

**Timetable:** Start Date: \_\_\_\_\_ Estimated End Date for all  
 Land Disturbing Activity: \_\_\_\_\_

Please note: The operator is responsible for all construction activities within the boundaries of the project until all construction is complete. If individual lots are to be sold within a subdivision or commercial park, the operator should consider developing contractual agreements to bind lot buyers and builders to compliance with the Soil Erosion Control Plan established by the operator, and to indemnify the operator for any violations. An example of a contractual clause of this nature may be obtained by contacting IDEM, Office of Water Management, Rule 5 Desk at 317/232-8760.

State Form 47487 (R/7-96)

**Exclusions From Coverage Under this General Permit:**

1. Storm water discharges excluded by any provision of 327 IAC 15-2-3.
2. Storm water discharges to waters designated as outstanding state resources listed in 327 IAC 2-1-2(3) or waters designated for exceptional use listed in 327 IAC 2-1-11(b).

**Soil Erosion Control Plan Certification:**

By signing this Notice of Intent letter, I, the operator, certify the following:

- A. The erosion control measures included in the Soil Erosion Control Plan comply with the requirements of 327 IAC 15-5-7 and 15-5-9 and the plan complies with applicable state, county, and local erosion control requirements;
- B. The erosion control measures will be implemented in accordance with the plan;
- C. The appropriate state, county, or local erosion control authority and the county Soil and Water Conservation District (SWCD) office have been sent a copy of the erosion control plan for review; and
- D. Implementation of the erosion control measures will be conducted by personnel trained in erosion control practices.

**Operator Responsibility Statement:**

By signing this Notice of Intent letter, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Operator \_\_\_\_\_ Date \_\_\_\_\_

**In Addition to this Form, Completed in Full, Please Submit the Following:**

\_\_\_\_\_ Proof of publication in a newspaper of general circulation in the affected area notifying the public that a construction activity is to commence, including the start date, end date, and location of the project, and the name and address or phone number of the contact person;

\_\_\_\_\_ \$100 check or money order payable to the Indiana Department of Environmental Management.

**Mail to:**

Indiana Department of Environmental Management  
Office of Water Management  
100 North Senate Avenue, P.O. Box 6015  
Indianapolis, IN 46206-6015  
Attention: Permits Section, Storm Water Group

Questions regarding Soil Erosion Control Plan development or implementation may be directed to your local SWCD or Department of Natural Resources office. Questions regarding the Notice of Intent may be directed to the Rule 5 contact person at 317/232-8760 or 800/451-6027. The NOI should be submitted only after your Soil Erosion Control Plan has been submitted to your local SWCD. Any person initiating earth disturbing activity before submittal of the Soil Erosion Control Plan, the NOI, and the \$100 filing fee is operating without a permit and is subject to enforcement and penalty under IC 13-30.



# PERMIT APPLICATION

Mail To Division of Water  
Department of Natural Resources  
402 West Washington Street, Room W264  
Indianapolis, Indiana 46204-2748  
Telephone Number: (317) 233-5635  
Fax Number: (317) 233-4579

Approved by the State Board of Accounts(Pending)

AGENCY USE ONLY			
Application # _____	Section Coordinates _____	UTM North _____	UTM East _____
30 Day Notice _____	Fee Submitted \$ _____	Check # _____	Receipt # _____

Based on the "INSTRUCTIONS", I am submitting this application to perform work under:

- |   |  |
|---|--|
| <input type="checkbox"/> IC 14-26-2 Lake Preservation Act             | <input type="checkbox"/> IC 14-29-1 Navigable Waterways Act      |
| <input type="checkbox"/> IC 14-26-5 Lowering of the Ten Acre Lake Act | <input type="checkbox"/> IC 14-29-3 Sand and Gravel Permits Act  |
| <input type="checkbox"/> IC 14-28-1 Flood Control Act                 | <input type="checkbox"/> IC 14-29-4 Construction of Channels Act |

## PLEASE TYPE OR PRINT

### 1. APPLICANT INFORMATION

Name of Applicant \_\_\_\_\_ Name of Contact Person \_\_\_\_\_

Mailing Address \_\_\_\_\_  
(Street, P.O. Box or Rural Route)

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Daytime Telephone Number (\_\_\_\_) \_\_\_\_\_ Fax Number (\_\_\_\_) \_\_\_\_\_

### 2. AGENT INFORMATION

Name of Authorized Agent \_\_\_\_\_ Name of Contact Person \_\_\_\_\_

Mailing Address \_\_\_\_\_  
(Street, P.O. Box or Rural Route)

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Daytime Telephone Number (\_\_\_\_) \_\_\_\_\_ Fax Number (\_\_\_\_) \_\_\_\_\_

### 3. PROPERTY OWNER INFORMATION

Name of Property Owner \_\_\_\_\_ Name of Contact Person \_\_\_\_\_

Mailing Address \_\_\_\_\_  
(Street, P.O. Box or Rural Route)

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Daytime Telephone Number (\_\_\_\_) \_\_\_\_\_ Fax Number (\_\_\_\_) \_\_\_\_\_

Relationship of applicant to property: ☐ Owner ☐ Purchaser ☐ Lessee Other \_\_\_\_\_

**4. AFFIRMATION OF PERSONAL SERVICE, 1ST CLASS MAIL SERVICE, OR CERTIFIED MAIL SERVICE**

I have provided public notice to the listed property owners in conformance with the provisions of IC 14-11-4 and 310 IAC 0.6 through the method indicated below.

(Check the appropriate Box - Please make copies of this blank page if additional pages are required)

Property Owner (if not applicant or adjacent landowner)  Address  City                      State                      Zip Code	<input type="checkbox"/> Personal Service was provided on : _____ (date)  <input type="checkbox"/> 1st Class Mail Service was provided on: _____ (date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.  <input type="checkbox"/> Certified Mail service was provided on: _____ (date) PS Form 3811 (green card) is attached as proof of mailing.
Adjacent Landowner:  Address  City                      State                      Zip Code	<input type="checkbox"/> Personal Service was provided on : _____ (date)  <input type="checkbox"/> 1st Class Mail Service was provided on: _____ (date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.  <input type="checkbox"/> Certified Mail service was provided on: _____ (date) PS Form 3811 (green card) is attached as proof of mailing.
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Adjacent Landowner:  Address  City                      State                      Zip Code	<input type="checkbox"/> Personal Service was provided on : _____ (date)  <input type="checkbox"/> 1st Class Mail Service was provided on: _____ (date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.  <input type="checkbox"/> Certified Mail service was provided on: _____ (date) PS Form 3811 (green card) is attached as proof of mailing.
Adjacent Landowner:  Address  City                      State                      Zip Code	<input type="checkbox"/> Personal Service was provided on : _____ (date)  <input type="checkbox"/> 1st Class Mail Service was provided on: _____ (date) I affirm that 21 days have passed without the mailing returned as undelivered or undeliverable. PS Form 3817 is attached as proof of mailing.  <input type="checkbox"/> Certified Mail service was provided on: _____ (date) PS Form 3811 (green card) is attached as proof of mailing.

5.

### PROJECT DESCRIPTION

**5.1 Description Narrative: (See Application Information Packet)**

[illegible]

**6.**

### PROJECT LOCATION

**6-1 Location Narrative: (See Application Information Packet)**

**Stream/Lake Name**


## 6-2 Driving Directions: (See Application Information Packet)

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**6-3 Special Information: (See Application Information Packet)**

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**6-4 Project Location Map: (See Application Information Packet)**

**6-4 Project Location Map: (See Application Information Packet)**

**6-5 Project Site Map: (See Application Information Packet)**

**6-5 Project Site Map: (See Application Information Packet)**

7.

**DISTURBED AREA DRAWING**

7.1 Drawing Requirements: (See Application Information Packet)

8.

**PROJECT PHOTOGRAPHS**

8-1 Images: (See Application Information Packet)

8-2 Photo Orientation Map: (See Application Information Packet)

8-3 Photo Documentation: (See Application Information Packet)

9.

**RELATED PROJECT INFORMATION****Department of Natural Resources**

Administrative Cause #

Related Application(s) #

Early Coordination #

Utility Exemption #

Recommendation #

Violation #

**Department of Environmental Management**

Section 401 #

**Corps of Engineers**

Public Notice #

Section 10 Application #

Section 404 Application #

10.

**STATEMENT OF AFFIRMATION**

I hereby swear or affirm, under the penalties for perjury, that the information submitted herewith is to the best of my knowledge and belief, true, accurate and complete, and that the property owner (s), and adjoining landowners have been notified of the activity. I further certify that I possess the authority to undertake the proposed or completed activities. I hereby grant to the Department of Natural Resources, the right to enter the above-described location to inspect the proposed or completed work.

Signature of Applicant or Authorized Agent (REQUIRED)

Date

11.

**REGULATORY FEES**

11-1 Regulatory Fees Submitted: (See Application Information Packet)

11-3 Payment Method: (See Application Information Packet)

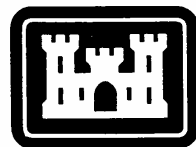
**REQUIREMENT FOR ADDITIONAL INFORMATION AND PERMITS**

Application made to and approval granted by the Department of Natural Resources does not in any way relieve the applicant of the necessity of securing easements or other property rights, permits and approvals from affected property owners and other local, state, and federal agencies.

United States Army Corps of Engineers

# Regulatory Program

*Applicant Information*

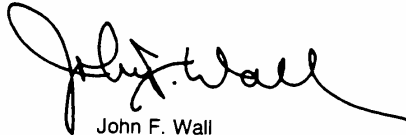


*This Pamphlet Supersedes EP 1145-2-1, November 1977*

## INTRODUCTION

This pamphlet is designed to assist you in applying for a Department of the Army permit from the Corps of Engineers. The pamphlet is not intended to be a complete description of all aspects of the permit program, but will provide general information of a non-technical nature and specific guidance on how to complete a permit application. Full explanation of the program may be found in Title 33 Code of Federal Regula-

tions, Parts 320 through 330. These regulations are available for review at the Corps of Engineers District offices listed at the back of this pamphlet. Answers to technical questions and detailed information about special aspects of the program that pertain to your geographical area and your proposed activity may also be obtained from Corps of Engineers District offices.

A handwritten signature in black ink, appearing to read "John F. Wall". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

John F. Wall  
Major General, USA  
Director of Civil Works

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### Authority for the Regulatory Program

The U.S. Army Corps of Engineers has been regulating activities in the nation's waters since 1890. Until the 1960's the primary purpose of the regulatory program was to protect navigation. Since then, as a result of laws and court decisions, the program has been broadened so that it now considers the full public interest for both the protection and utilization of water resources.

The regulatory authorities and responsibilities of the Corps of Engineers are based on the following laws:

- ☐ **Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)** prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers.
- ☐ **Section 404 of the Clean Water Act (33 U.S.C. 1344).** Section 301 of this Act prohibits the discharge of dredged or fill material into waters of the United States without a permit from the Corps of Engineers.

- ☐ **Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413)** authorizes the Corps of Engineers to issue permits for the transportation of dredged material for the purpose of dumping it into ocean waters.

Other laws may also affect the processing of applications for Corps of Engineers permits. Among these are the National Environmental Policy Act, the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Deep-water Port Act, the Federal Power Act, the Marine Mammal Protection Act, the Wild and Scenic Rivers Act, and the National Fishing Enhancement Act of 1984.



## Explanation of Some Commonly Used Terms

Certain terms which are closely associated with the regulatory program are explained briefly in this section. If you need more detailed definitions, refer to the Code of Federal Regulations (33 CFR Parts 320 through 330) or contact a Corps district regulatory office.

**Activity(ies)** as used in this pamphlet includes structures (for example a pier, wharf, bulkhead, or jetty) and work (which includes dredging, disposal of dredged material, filling, excavation or other modification of a navigable water of the United States).

**Navigable Waters of the United States** are those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past or may be susceptible to use to transport interstate or foreign commerce. These are waters that are navigable in the traditional sense where permits are required for certain activities pursuant to Section 10 of the Rivers and Harbors Act. This term should not be confused with the term *waters of the United States* below.

**Waters of the United States** is a broader term than navigable waters of the United States defined above. Included are adjacent wetlands and tributaries to navigable waters of the United States and other waters where the degradation or destruction of which could affect interstate or foreign commerce. These are the waters where permits are required for the discharge of dredged or fill material pursuant to Section 404 of the Clean Water Act.

**Pre-application Consultation** is one or more meetings between members of the district engineer's staff and an applicant and his agent or his consultant. A pre-application consultation is usually related to applications

for major activities and may involve discussion of alternatives, environmental documents, National Environmental Policy Act procedures, and development of the scope of the data required when an environmental impact statement is required.

**Public Hearings** may be held to acquire information and give the public the opportunity to present views and opinions. The Corps may hold a hearing or participate in joint public hearings with other Federal or state agencies. The district engineer may specify in the public notice that a hearing will be held. In addition, any person may request in writing during the comment period that a hearing be held. Specific reasons must be given as to the need for a hearing. The district engineer may attempt to resolve the issue informally or he may set the date for a public hearing. Hearings are held at times and places that are convenient for the interested public. Very few applications involve a public hearing.

**The Public Interest Review** is the term which refers to the evaluation of a proposed activity to determine probable impacts. Expected benefits are balanced against reasonably foreseeable detriments. All relevant factors are weighed. Corps policy is to provide applicants with a timely and carefully weighed decision which reflects the public interest.

**Public Notice** is the primary method of advising interested public agencies and private parties of the proposed activity and of soliciting comments and information necessary to evaluate the probable impact on the public interest. Upon request, anyone's name will be added to the distribution list to receive public notices.

**Waterbody** is a river, creek, stream, lake, pool, bay, wetland, marsh, swamp, tidal flat, ocean, or other water area.

## Questions That Are Frequently Asked

Various questions are often asked about the regulatory program. It is hoped that these answers will help you to understand the program better.

- Q.** When should I apply for a Corps permit?
- A.** Since two to three months is normally required to process a routine application involving a public notice, you should apply as early as possible to be sure you have all required approvals before your planned commencement date. For a large or complex activity that may take longer, it is often helpful to have a "pre-application consultation" or informal meeting with the Corps during the early planning phase of your project. You may receive helpful information at this point which could prevent delays later. When in doubt as to whether a permit may be required or what you need to do, don't hesitate to call a district regulatory office.
- Q.** I have obtained permits from local and state governments. Why do I have to get a permit from the Corps of Engineers?
- A.** It is possible you may not have to obtain an individual permit, depending on the type or location of work. The Corps has many general permits which authorize minor activities without the need for individual processing. Check with your Corps district regulatory office for information on general permits. When a general permit does not apply, you may still be required to obtain an individual permit.
- Q.** What will happen if I do work without getting a permit from the Corps?
- A.** Performing unauthorized work in waters of the United States or failure to comply with terms of a valid permit can have

serious consequences. You would be in violation of Federal law and could face stiff penalties, including fines and /or requirements to restore the area.

Enforcement is an important part of the Corps regulatory program. Corps surveillance and monitoring activities are often aided by various agencies, groups, and individuals, who report suspected violations. When in doubt as to whether a planned activity needs a permit, contact the nearest district regulatory office. It could save a lot of unnecessary trouble later.

- Q.** How can I obtain further information about permit requirements?
- A.** Information about the regulatory program is available from any Corps district regulatory office. Addresses and telephone numbers of offices are listed at the back of this pamphlet. Information may also be obtained from the water resource agency in your state.
- Q.** Why should I waste my time and yours by applying for a permit when you probably won't let me do the work anyway?
- A.** Nationwide, only three percent of all requests for permits are denied. Those few applicants who have been denied permits usually have refused to change the design, timing, or location of the proposed activity. When a permit is denied, an applicant may redesign the project and submit a new application. To avoid unnecessary delays pre-application conferences, particularly for applications for major activities, are recommended. The Corps will endeavor to give you helpful information, including factors which will be considered during the public interest review, and alternatives to consider that may prove to be useful in designing a project.

**Q.** What is a wetland and what is its value?

**A.** Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas. A significant natural resource, wetlands serve important functions relating to fish and wildlife; food chain production; habitat; nesting; spawning; rearing and resting sites for aquatic and land species; protection of other areas from wave action and erosion; storage areas for storm and flood waters; natural recharge areas where ground and surface water are interconnected; and natural water filtration and purification functions.

Although individual alterations of wetlands may constitute a minor change, the cumulative effect of numerous changes often results in major damage to wetland resources. The review of applications for alteration of wetlands will include consideration of whether the proposed activity is dependent upon being located in an aquatic environment.

**Q.** How can I design my project to eliminate the need for a Corps permit?

**A.** If your activity is located in an area of tidal waters, the best way to avoid the need for a permit is to select a site that is above the high tide line and avoids wetlands or other waterbodies. In the vicinity of fresh water, stay above ordinary high water and avoid wetlands adjacent to the stream or lake. Also, it is possible that your activity is exempt and does not need a Corps permit or that it has been authorized by a nationwide or regional general permit. So, before you build, dredge or fill, contact the Corps district regulatory office in your area for specific information about location, exemptions, and regional and nationwide general permits.

## 6

**General**

The application form used to apply for a permit is Engineer Form 4345, *Application for a Department of the Army Permit*. You can obtain the application from one of the Corps of Engineers district regulatory offices listed in the back of this pamphlet. Some offices may use a slightly modified form for joint processing with a state agency; however, the required information is basically the same. It is important that you provide complete information in the requested format. If incomplete information is provided, processing of your application will be delayed. This information will be used to determine the appropriate form of authorization, and to evaluate your proposal. Some categories of activities have been previously authorized by nationwide or regional permits, and no further Corps approvals are required. Others may qualify for abbreviated permit processing, with authorizations in the form of letters of permission, in which a permit decision can usually be reached in less than 30 days. For other activities, a Public Notice may be required to notify Federal, state, and local agencies, adjacent property owners, and the general public of the proposal to allow an opportunity for review and comment or to request a public hearing. Most applications involving Public Notices are completed within four months and many are completed within 60 days.

The district engineer will begin to process your application immediately upon receipt of all required information. You will be sent an acknowledgement of its receipt and the application number assigned to your file. You should refer to this number when inquiring about your application. Your proposal will be reviewed, balancing the need and expected benefits against the probable impacts of the work, taking into consideration all comments received and other relevant factors. This process is called the *public interest review*. The Corps goal is to reach a decision regarding permit issuance or denial within 60 days of receipt of a complete application. However, some complex activities, issues, or requirements of law may prevent the district engineer from meeting this goal.

For any specific information on the evaluation process, filling out the application forms, or the status of your application, you should contact the regulatory branch of the Corps of Engineers district office which has jurisdiction over the area where you plan to do the work.

**Typical Processing Procedure for a Standard Individual Permit**

1. Preapplication consultation (optional)
2. Applicant submits ENG Form 4345 to district regulatory office\*
3. Application received and assigned identification number
4. Public notice issued (within 15 days of receiving all information)
5. 15 to 30 day comment period depending upon nature of activity
6. Proposal is reviewed\*\* by Corps and:
  - Public
  - Special interest groups
  - Local agencies
  - State agencies
  - Federal agencies
7. Corps considers all comments
8. Other federal agencies consulted, if appropriate
9. District engineer may ask applicant to provide additional information
10. Public hearing held, if needed
11. District engineer makes decision
12. Permit issued
  - or
  - Permit denied and applicant advised of reason

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\*A local variation, often a joint federal-state application form may be submitted.

\*\*Review period may be extended if applicant fails to submit information or due to requirements of certain laws.

## Evaluation Factors

The decision whether to grant or deny a permit is based on a public interest review of the probable impact of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on items such as:

- conservation
- economics
- aesthetics
- general environmental concerns
- wetlands
- cultural values
- fish and wildlife values
- flood hazards
- floodplain values
- food and fiber production
- navigation
- shore erosion and accretion
- recreation
- water supply and conservation
- water quality
- energy needs
- safety
- needs and welfare of the people
- considerations of private ownership

The following general criteria will be considered in the evaluation of every application:

- ☐ the relative extent of the public and private need for the proposed activity;
- ☐ the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed activity; and
- ☐ the extent and permanence of the beneficial and/or detrimental effects which the proposed activity is likely to have on the public and private uses to which the area is suited.

### Section 404(b) (1) of the Clean Water Act

If your project involves the discharge of dredged or fill material, it will be necessary for the Corps to evaluate your proposed activity under the Section 404(b)(1) guidelines prepared by the Environmental Protection Agency. The guidelines restrict discharges into aquatic areas where less environmentally damaging, practicable alternatives exist.

## Instructions for Preparing an Application

The instructions given below, together with the sample application and drawings, should help in completing the required application form. If you have additional questions, do not hesitate to contact the district regulatory office.

### **Block Number 1. Application Number.**

Leave this block blank. When your completed application is received, it will be assigned a number for identification. You will be notified of the number in an acknowledgement letter. Please refer to this number in any correspondence or inquiry concerning your application.

### **Block 2. Name and address of applicant(s).**

Fill in name, mailing address, and telephone number(s) for all applicants. The telephone number(s) should be a number where you can be reached during business hours. If space is needed for additional names, attach a sheet of white, 8½ × 11 inch paper labeled "Block 2 Continued."

### **Block 3. Name, address and title of authorized agent.**

It is not necessary to have an agent represent you; however, if you do, fill in the agent's name, address, title and telephone number(s). If your agent is submitting and signing the application, you must fill out and sign the Statement of Authorization in Block 3.

### **Block 4. Detailed description of proposed activity.**

The written description and the drawings are the most important parts of the application. If there is not enough space in Block 4, (a), (b) or (c) attach additional sheet(s) of white, 8½ × 11 inch paper labeled "Block 4 Continued."

#### **a. Activity.**

Describe the overall activity. Give the approximate dimensions of structures, fills, excavations (lengths, widths, heights or depths).

**b. Purpose.** Describe the purpose, need and intended use (public, private, commercial, or other use) of the proposed activity. Include a description of related facilities, if any, to be constructed on adjacent land. Give the date you plan to begin work on the activity and the date work is expected to be completed.

#### **c. Discharge of Dredged or Fill Material.**

If the activity will involve the discharge of dredged or fill material, describe the type (rock, sand, dirt, rubble, etc.), quantity (in cubic yards), and mode of transportation to the discharge site.

### **Block 5. Names and addresses of adjoining property owners, lessees, etc. whose property adjoins the waterbody.**

List complete names, addresses and zip codes of adjacent property owners (both public and private), lessee, etc., whose property also adjoins the waterbody or wetland, in order that they may be notified of the proposed activity. This information is usually available at the local tax assessor office. If more space is needed attach a sheet of white, 8½ × 11 inch paper labeled "Block 5 Continued."

### **Block 6. Waterbody and location on waterbody where activity exists or is proposed.**

Fill in the name of the waterbody and the river mile (if known) at the location of the activity. Include easily recognizable landmarks on the shore of the waterbody to aid in locating the site of the activity.

### **Block 7. Location and land where activity exists or is proposed.**

This information is used to locate the site. Give the street address of the property where the proposed activity will take place. If the site does not have a street address, give the best descriptive location (name or waterbody), names and/or numbers of roads or highways, name of nearest community or town, name of county and state, and directions, such as 2 miles east of Brown's Store on Route 105.

Do not use your home address unless that is the location of the proposed activity. Do not use a post office box number.

**Block 8. Information about completed activity.** Provide information about parts of the activity which may be complete. An activity may have been authorized by a previously issued permit, may exist from a time before a Corps permit was required or may be constructed on adjacent upland.

**Block 9. Information about approvals or denials by other government agencies.**

You may need approval or certification from other Federal, interstate, state, or local government agencies for the activity described

in your application. Applications you have submitted, and approvals, certifications, or disapprovals that you have received should be recorded in Block 9. It is not necessary to obtain other Federal, state, and local permits before applying for a Corps of Engineers permit.

**Block 10. Signature of applicant or agent.**

The application must be signed in Block 10 by the owner, lessee, or a duly authorized agent. The person named in Block 3 will be accepted as the officially designated agent of the applicant. The signature will be understood to be affirmation that the applicant possesses the requisite property interest to undertake the proposed activity.



## APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(31 CFR 325)

OMB APPROVAL NO. 0702-0036  
Expires 30 June 1986

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. APPLICATION NUMBER (To be assigned by Corps)

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

None

Telephone no. during business hours

A/C ( ) \_\_\_\_\_ (Residence)

A/C ( ) \_\_\_\_\_ (Office)

Statement of Authorization: I hereby designate and authorize \_\_\_\_\_

\_\_\_\_\_ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

SIGNATURE OF APPLICANT

DATE

2. NAME AND ADDRESS OF APPLICANT

Fred R. Harris  
852 West Branch Road  
Blue Harbor, Maryland 21703

Telephone no. during business hours

A/C (301) 585-2779 (Residence)

A/C ( ) \_\_\_\_\_ (Office)

4. DETAILED DESCRIPTION OF PROPOSED ACTIVITY

4a. ACTIVITY

Build timber bulkhead and pier and fill.

4b. PURPOSE

To provide boat access and prevent erosion of shoreline at my place of residence.

4c. DISCHARGE OF DREDGED OR FILL MATERIAL

Approximately 200 cubic yards of upland fill will be placed between new bulkhead and existing shoreline.

5. NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

Mary L. Clark  
850 West Branch Road  
Blue Harbor, Maryland 21703

(301) 585-8830

Harry N. Hampton  
854 West Branch Road  
Blue Harbor, Maryland 21703

(301) 585-3676

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

West Branch of the Haven River on Blue Harbor.

7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

ADDRESS

852 West Branch Road

STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

King Edward, Maryland 21703  
COUNTY STATE ZIP CODE

Town of Blue Harbor

LOCAL GOVERNING BODY WITH JURISDICTION OVER SITE

8. Is any portion of the activity for which authorization is sought now completed? ☐ YES ☒ NO  
If answer is "Yes" give reasons, month and year the activity was completed. Indicate the existing work on the drawings.

9. List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharges or other activities described in this application.

ISSUING AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE OF APPLICATION	DATE OF APPROVAL	DATE OF DENIAL
Town of Blue Harbor	Zoning	BH25172	6/20/82	6/30/82	
Md DNR	Certification	DNR258WQ	6/11/82	8/12/82	

10. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

*Frederick Harris*  
SIGNATURE OF APPLICANT

Oct. 15, 1982  
DATE

SIGNATURE OF AGENT

DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.

## General Information

Three types of drawings—Vicinity, Plan, and Elevation—are required to accurately depict activities (See sample drawings on pages 16 and 17).

Submit one original, or good quality copy, of all drawings on  $8\frac{1}{2} \times 11$  inch white paper (tracing cloth or film may be used). Submit the fewest number of sheets necessary to adequately show the proposed activity. Drawings should be prepared in accordance with the general format of the samples, using block style lettering. Each page should have a title block. See check list below. Drawings do not have to be prepared by an engineer, but professional assistance may become necessary if the project is large or complex.

Leave a 1-inch margin at the top edge of each sheet for purposes of reproduction and binding.

In the title block of each sheet of drawings identify the proposed activity and include the name of the body of water; river mile (if applicable); name of county and state; name of applicant; number of the sheet and total number of sheets in set; and date the drawing was prepared.

Since drawings must be reproduced, use heavy dark lines. Color shading cannot be used; however, dot shading, hatching, or similar graphic symbols may be used to clarify line drawings.

## Vicinity Map

The vicinity map you provide will be printed in any public notice that is issued and used by the Corps of Engineers and other reviewing agencies to locate the site of the proposed activity. You may use an existing road map or U.S. Geological Survey topographic map (scale 1:24,000) as the vicinity map. Please include sufficient details

to simplify locating the site from both the waterbody and from land. Identify the source of the map or chart from which the vicinity map was taken and, if not already shown, add the following:

- ☐ location of activity site (draw an arrow showing the exact location of the site on the map).
- ☐ latitude, longitude, river mile, if known, and/or other information that coincides with Block 6 on the application form.
- ☐ name of waterbody and the name of the larger creek, river, bay, etc., that the waterbody is immediately tributary to.
- ☐ names, descriptions and location of landmarks.
- ☐ name of all applicable political (county, parish, borough, town, city, etc.) jurisdictions.
- ☐ name of and distance to nearest town, community, or other identifying locations.
- ☐ names or numbers of all roads in the vicinity of the site.
- ☐ north arrow.
- ☐ scale.

## Plan View

The plan view shows the proposed activity as if you were looking straight down on it from above. Your plan view should clearly show the following:

- ☐ Name of waterbody (river, creek, lake, wetland, etc.) and river mile (if known) at location of activity.
- ☐ Existing shorelines.
- ☐ Mean high and mean low water lines and maximum (spring) high tide line in tidal areas.
- ☐ Ordinary high water line and ordinary low water line if the proposed activity is located on a non-tidal waterbody.

- ☐ Average water depths around the activity.
- ☐ Dimensions of the activity and distance it extends from the high water line into the water.
- ☐ Distances to nearby Federal projects, if applicable.
- ☐ Distance between proposed activity and navigation channel, where applicable.
- ☐ Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.
- ☐ Location of any wetlands (marshes, swamps, tidal flats, etc.)
- ☐ North arrow.
- ☐ Scale.
- ☐ If dredged material is involved, you must describe the type of material, number of cubic yards, method of handling, and the location of fill and spoil disposal area. The drawing should show proposed retention levees, weirs, and/or other means for retaining hydraulically placed materials.
- ☐ Mark the drawing to indicate previously completed portions of the activity.

### **Elevation and/or Cross Section View**

The elevation and/or cross section view is a scale drawing that shows the side, front, or rear of the proposed activity. If a section view is shown, it represents the proposed structure as it would appear if cut internally for display. Your elevation should clearly show the following:

- ☐ Water elevations as shown in the plan view.

- ☐ Water depth at waterward face of proposed activity or, if dredging is proposed, dredging and estimated disposal grades.
- ☐ Dimensions from mean high water line (in tidal waters) for proposed fill or float, or high tide line for pile supported platform. Describe any structures to be built on the platform.
- ☐ Cross section of excavation or fill, including approximate side slopes.
- ☐ Graphic or numerical scale.
- ☐ Principal dimensions of the activity.

### **Notes on Drawings\***

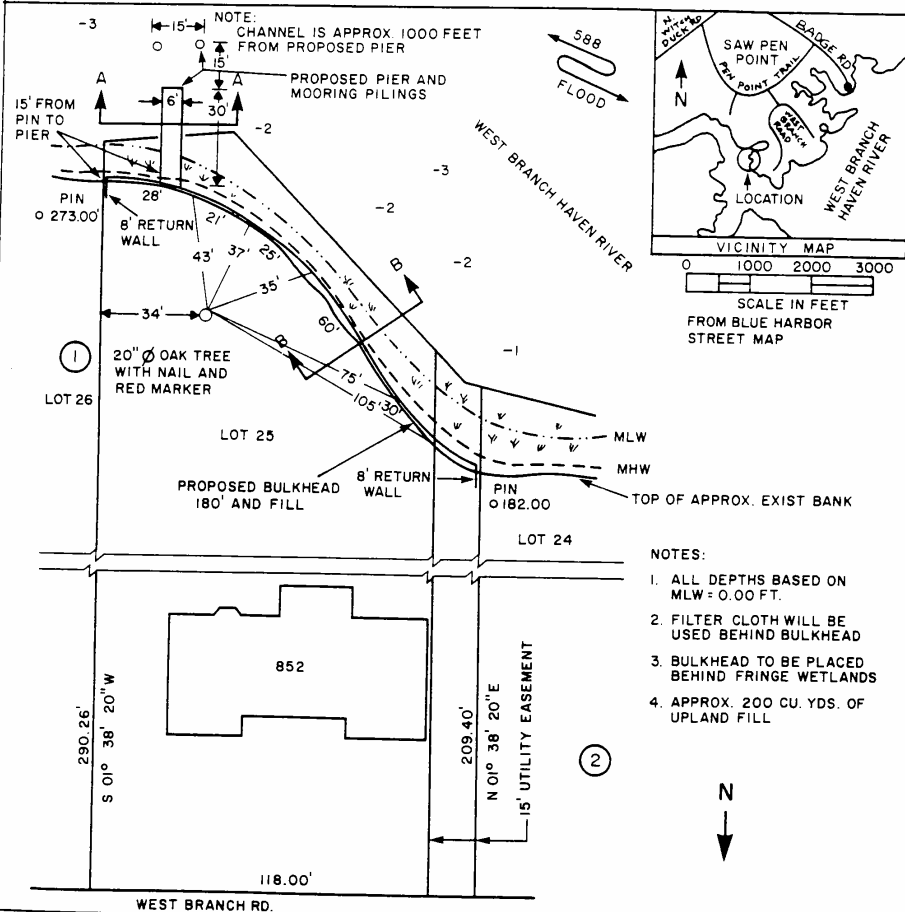
- ☐ Names of adjacent property owners who may be affected. Complete names and addresses should be shown in Block 5 on ENG Form 4345.
- ☐ Legal property description: Number, name of subdivision, block and lot number. Section, Township and Range (if applicable) from plot, deed or tax assessment.
- ☐ Photographs of the site of the proposed activity are not required; however, pictures are helpful and may be submitted as part of any application.

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*\*Drawings should be as clear and simple as possible (i.e., not too "busy").*

# SAMPLE DRAWINGS FOR A PERMIT APPLICATION

NOTE: THE DRAWINGS SUBMITTED NEED NOT BE PREPARED BY A PROFESSIONAL DRAFTSMAN AS IN THESE SAMPLES.



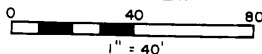
PURPOSE: PREVENT EROSION AND PROVIDE BOATING ACCESS

DATUM: MLW

ADJACENT PROPERTY OWNERS:

1. MARY L. CLARK
2. HARRY N. HAMPTON
- 3.

## PLAN VIEW



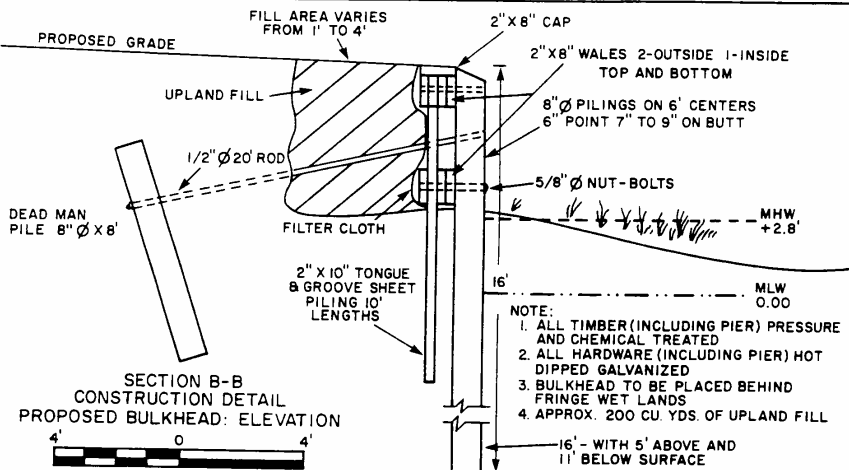
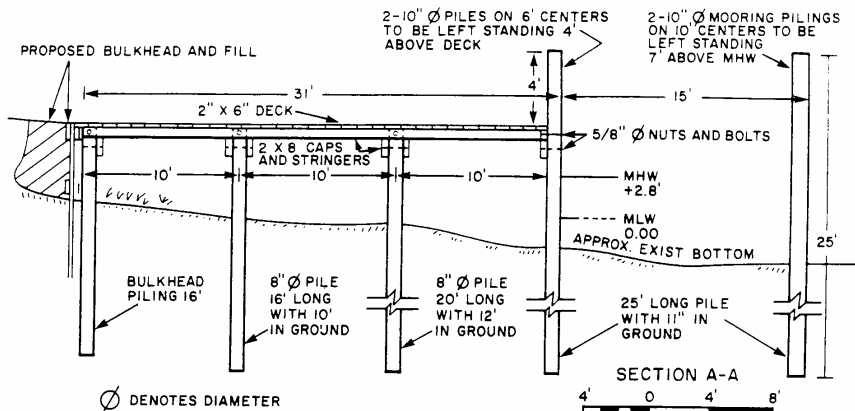
FRED R. HARRIS  
852 WEST BRANCH ROAD  
BLUE HARBOR, MD 21703

PROPOSED BULKHEAD PIER AND FILL

IN: WEST BRANCH HAVEN RIVER  
AT: BLUE HARBOR  
COUNTY OF: KING EDWARD STATE: MD  
APPLICATION BY: FRED R. HARRIS

SHEET 1 OF 2 DATE 10-16-82

REV. 11-28-82



PURPOSE: PREVENT EROSION AND PROVIDE BOATING ACCESS

DATUM: MLW

ADJACENT PROPERTY OWNERS:

1. MARY L. CLARK
2. HARRY N. HAMPTON
- 3.

### SECTION VIEWS

FRED R. HARRIS  
852 WEST BRANCH ROAD  
BLUE HARBOR, MD 21703

PROPOSED BULKHEAD PIER AND FILL

IN: WEST BRANCH HAVEN RIVER  
AT: BLUE HARBOR  
COUNTY OF: KING EDWARD STATE: MD  
APPLICATION BY: FRED R. HARRIS

SHEET 2 OF 2 DATE 10-16-82

# DIVISIONS AND DISTRICTS FOR REGULATORY ACTIVITIES





*Note: In Iowa the eastern bank of the Missouri River is regulated by the Omaha office.*



# LOCATIONS OF REGULATORY OFFICES

Address correspondence to:

**The District Engineer  
U.S. Army Engineer  
District**

Please include attention  
line in address.

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## **ALASKA**

P.O. Box 898  
Anchorage, AK  
99506-0898  
Attention: NPACO-RF  
907/753-2712

## **ALBUQUERQUE**

P.O. Box 1580  
Albuquerque, NM  
87103-1580  
Attention: SWACO-OR  
505/766-2776

## **BALTIMORE**

P.O. Box 1715  
Baltimore, MD 21203-1715  
Attention: NABOP-R  
301/962-3670  
*Joint application with  
New York, Maryland*

## **BUFFALO**

1776 Niagara Street  
Buffalo, NY 14207-3199  
Attention: NCBCO-S  
716/876-5454 x2313  
*Joint application with  
New York*

## **CHARLESTON**

P.O. Box 919  
Charleston, SC  
29402-0919  
Attention: SACCO-P  
803/724-4330

## **CHICAGO**

219 S. Dearborn Street  
Chicago, IL 60604-1797  
Attention: NCCCO-R  
312/353-6428  
*Joint application with  
Illinois*

## **DETROIT**

P.O. Box 1027  
Detroit, MI 48231-1027  
Attention: NCECO-L  
313/226-2218  
*Joint application with  
Michigan*

## **FT. WORTH**

P.O. Box 17300  
Ft. Worth, TX 76102-0300  
Attention: SWFOD-O  
817/334-2681

## **GALVESTON**

P.O. Box 1229  
Galveston, TX 77553-1229  
Attention: SWGCO-R  
409/766-3925

## **HUNTINGTON**

502 8th Street  
Huntington, WV 25701-2070  
Attention: ORHOP-F  
304/529-5487  
*Joint application with  
West Virginia*

## **HONOLULU**

Building 230, Fort Shafter  
Honolulu, HI 96858-5440  
Attention: PODCO-O  
808/438-9258

## **JACKSONVILLE**

P.O. Box 4970  
Jacksonville, FL 32232-0019  
Attention: SAJRD  
904/791-1659  
*Joint application with  
Florida, Virgin Islands*

## **KANSAS CITY**

700 Federal Building  
601 E. 12th Street  
Kansas City, MO 64106-2896  
Attention: MRKOD-P  
816/374-3645

## **LITTLE ROCK**

P.O. Box 867  
Little Rock, AR  
72203-0867  
Attention: SWLCO-P  
501/378-5295

## **LOS ANGELES**

P.O. Box 2711  
Los Angeles, CA 90053-2325  
Attention: SPLCO-R  
213/688-5606

## **LOUISVILLE**

P.O. Box 59  
Louisville, KY 40201-0059  
Attention: ORLOP-F  
502/582-5452

*Joint application with  
Illinois*

## **MEMPHIS**

Clifford Davis Federal  
Building  
Room B-202  
Memphis, TN 38103-1894  
Attention: LMMCO-G  
901/521-3471  
*Joint application with  
Missouri, Tennessee,  
Kentucky*

## **MOBILE**

P.O. Box 2288  
Mobile, AL 36628-00001  
Attention: SAMOP-S  
205/690-2658  
*Joint application with  
Mississippi*

## **NASHVILLE**

P.O. Box 1070  
Nashville, TN 37202-1070  
Attention: ORNOR-F  
615/251-5181  
*Joint application with TVA,  
Tennessee, Alabama*

**NEW ORLEANS**

P.O. Box 60267  
New Orleans, LA  
70160-0267  
Attention: LMNOD-S  
504/838-2255

**NEW YORK**

26 Federal Plaza  
New York, NY 10278-0090  
Attention: NANOP-R  
212/264-3996

**NORFOLK**

803 Front Street  
Norfolk, VA 23510-1096  
Attention: NAOOP-P  
804/446-3652  
*Joint application with  
Virginia*

**OMAHA**

P.O. Box 5  
Omaha, NE 68101-0005  
Attention: MROOP-N  
402/221-4133

**PHILADELPHIA**

U.S. Custom House  
2nd and Chestnut Street  
Philadelphia, PA  
19106-2991  
Attention: NAPON-R  
215/597-2812

**PITTSBURGH**

Federal Building  
1000 Liberty Avenue  
Pittsburgh, PA 15222-4186  
Attention: ORPOP-F  
412/644-4204  
*Joint application with  
New York*

**PORTLAND**

P.O. Box 2946  
Portland, OR 97208-2946  
Attention: NPPND-RF  
503/221-6995  
*Joint application with  
Oregon*

**ROCK ISLAND**

Clock Tower Building  
Rock Island, IL 61201-2004  
Attention: NCROD-S  
309/788-6361 x6370  
*Joint application with  
Illinois*

**SACRAMENTO**

650 Capitol Mall  
Sacramento, CA 95814-4794  
Attention: SPKCO-O  
916/440-2842

**ST. LOUIS**

210 Tucker Blvd., N  
St. Louis, MO 63101-1986  
Attention: LMSOD-F  
314/263-5703  
*Joint application with  
Illinois, Missouri*

**ST. PAUL**

1135 USPO & Custom  
House  
St. Paul, MN 55101-1479  
Attention: NCSCO-RF  
612/725-5819

**SAN FRANCISCO**

211 Main Street  
San Francisco, CA 94105-1905  
Attention: SPNCO-R  
415/974-0416

**SAVANNAH**

P.O. Box 889  
Savannah, GA 31402-0889  
Attention: SASOP-F  
912/944-5347  
*Joint application with  
Georgia*

**SEATTLE**

P.O. Box C-3755  
Seattle, WA 98124-2255  
Attention: NPSOP-RF  
206/764-3495  
*Joint application with Idaho*

**TULSA**

P.O. Box 61  
Tulsa, OK 74121-0061  
Attention: SWTOD-RF  
918/581-7261

**VICKSBURG**

P.O. Box 60  
Vicksburg, MS 39180-0060  
Attention: LMKOD-F  
601/634-5276  
*Joint application with  
Mississippi*

**WALLA WALLA**

Building 602  
City-County Airport  
Walla Walla, WA  
99362-9265  
Attention: NPWOP-RF  
509/522-6718  
*Joint application with  
Idaho*

**WILMINGTON**

P.O. Box 1890  
Wilmington, NC  
28402-1890  
Attention: SAWCO-E  
919/343-4511  
*Joint application with North  
Carolina*

**The Division Engineer  
U.S. Army Engineer  
Division**

**NEW ENGLAND**

424 Trapelo Road  
Waltham, MA 02254-9149  
Attention: NEDOD-R  
617/647-8338  
*Joint application with  
Massachusetts, Maine*



## Appendix 5

### Funding and Technical Resources

Funding Agency	Program Name or Authorization	Requirements
USDA	Conservation Reserve Program (CRP)	CRP is a voluntary program that offers long-term rental payments and cost-share assistance to establish long-term resource conserving cover on environmentally sensitive cropland or, in some cases, marginal pasture land.
USDA-NRCS	Wildlife Habitat Incentives Program (WHIP)	The WHIP is a voluntary program to develop and improve wildlife habitat on private lands. It provides both technical assistance and cost sharing to help establish and improve fish and wildlife habitat.
Department of Interior - USFWS	Partners for Wildlife Habitat Restoration Program (PWHRP)	The PWHRP provides technical and financial assistance to private landowners through voluntary cooperative agreements to restore degraded wetlands, native grasslands, riparian areas, and other habitats.
Department of Interior - USFWS	Wildlife Conservation and Appreciation Program (WCAP)	The WCAP provides grants to fund projects that bring together USFWS, State agencies, and private organizations and individuals. Projects include identification of significant problems that can adversely affect fish and wildlife and their habitats; actions to conserve species and their habitats; actions that will provide opportunities for the public to use and enjoy fish and wildlife through nonconsumptive activities; monitoring of species; and identification of significant habitats.
USEPA	Sustainable Development Challenge Grants	Grants are intended to initiate community-based projects that promote environmentally and economically sustainable development. This program challenges communities to invest in a sustainable future that will link environmental protection, economic prosperity, and community well-being.
USEPA	Environmental Justice Grants to Small Community Groups	This grant program provides financial assistance to community-based organizations and Tribal governments to support projects to design, demonstrate or disseminate practices, methods, or techniques related to environmental justice.
USDA - USFS	Cooperative Forestry Assistance Program (CFAP)	CFAP helps State Foresters or equivalent agencies with forest stewardship programs on private, State, local, and other non-Federal forest and rural lands, plus rural communities and urban areas. This program helps to achieve ecosystem health and sustainability by improving wildlife habitat, conserving forest land, reforestation, and improving soil and water quality.

## Appendix 5

### Funding and Technical Resources

USDA - NRCS	Forestry Incentives Program (FIP)	The FIP is intended to ensure the Nation's ability to meet future demand for sawtimber, pulpwood, and quality hardwoods. FIP provides cost share monies to help with the costs of tree planting, timber stand improvements, and related practices.
USDA - NRCS	Watershed Protection and Flood Prevention Program	This program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres.
USEPA	Capitalization Grants for Clean Water State Revolving Funds	EPA awards grants to States to capitalize their Clean Water State Revolving Funds (SRFs). The States, through the SRF, make loans for high priority water quality activities.
USEPA	Nonpoint Source Implementation Grants (319 Program)	Clean Water Act's Section 319 provides formula grants to the States to implement nonpoint source projects and programs.
USEPA	Pollution Prevention Grants Program	This program provides grants to States to implement pollution prevention projects.
USEPA	Water Quality Cooperative Agreements	Grants are provided to support creation of unique and new approaches to meeting stormwater, combined sewer outflows, sludge, and pretreatment requirements as well as enhancing State capabilities.
USDA - NRCS	Wetlands Reserve Program (WRP)	The WRP is a voluntary program to restore and protect wetlands on private property. WRP provides landowners with financial incentives to enhance wetlands in exchange for retiring marginal agricultural land.
Department of Interior - USFWS	Coastal Wetlands Planning, Protection and Restoration Act	This program, also known as National Wetlands Conservation Grants, provides funds to assist States in pursuing coastal wetland conservation projects. Funds can be used for acquisition of interests in coastal lands or waters, and for restoration, enhancement, or management of coastal wetland ecosystems on a competitive basis with all coastal States.

## Appendix 5

### Funding and Technical Resources

Department of Interior - USFWS	North American Wetlands Conservation Act Grant Program (NAWCA)	The NAWCA grant program promotes long-term conservation of North American wetland ecosystems, and the waterfowl and other migratory birds, fish and wildlife that depend upon such habitat. Principal conservation actions supported by NAWCA are acquisition, enhancement, and restoration of wetlands and wetlands-associated habitat.
USDA	Agricultural Conservation Program	The purpose of this program is to control erosion and sedimentation, encourage voluntary compliance with federal and state requirements to solve point and nonpoint source pollution, and improve water quality, among other objectives.
USDA - Forest Service	Stewardship Incentive Program	This program encourages private landowners to manage their forest land in ways that improve water quality, including tree planting and the implementation of best management practices for stream crossings and streamside management.
Department of Interior - Bureau of Reclamation	Construction Program	This program provides funding and assistance for the implementation of structural and operational measures to improve water management.
Department of Interior - USFWS	Refuges and Wildlife - North American Waterfowl Management Plan	To support a strategy for cooperative public/private wetland habitat conservation that will reverse decline in waterfowl and other wetland wildlife species in the United States, Canada, and Mexico. Public and private entities that agree to enter into partnership to acquire, restore, and enhance wetlands are eligible.
USEPA	State Revolving Funds Capitalization Grants	This program provides long-term source financing to states for the construction of wastewater treatment facilities and the implementation of other water quality management activities.
USEPA	Water Pollution Control - State and Interstate Program Support	This program assists states and interstate agencies in establishing adequate measures for prevention and control of surface water and groundwater pollution.

## Appendix 5

### Funding and Technical Resources

USACE	Section 206 "Aquatic Ecosystem Restoration"	Section 206 of the 1996 Water Resources Development Act provides authority for the Secretary to carry out an aquatic ecosystem restoration and protection project. A project is adopted for construction only after a detailed investigation determines that the project will improve the quality of the environment and is in the best interest of the public, and clearly shows the engineering feasibility and economic justification of the improvement.
USDA - Rural Utilities Service	Watershed Protection and Flood Prevention Loans	This program provides loan funds to help local sponsors provide the local share of the cost of watershed works of improvement for flood prevention, irrigation, drainage, water quality management, sedimentation control, fish and wildlife development, public water based recreation, and water storage and related costs.
USEPA	Clean Lakes Program (Section 314)	The Clean Lakes Program (Section 314 of CWA) provides assistance to States to assess water quality of publicly owned lakes, to diagnose the causes of degradation in lakes, to develop and implement lake restoration and protection plans, and for post restoration monitoring. Current federal policy has 314 funding included in the 319 program grants.
USEPA	Water Quality Management Planning	Section 604(b) funds are awarded under Section 205(j) to State water quality management agencies to carry out water quality management planning.
USEPA	Wetlands Protection Development Grants	These grants are intended to encourage wetlands protection program development or to enhance/augment existing effective programs.
Department of Interior - USFWS	Wildlife Conservation and Appreciation	This program is intended to establish a partnership among the USFWS, designated State Agencies, and private organizations and individuals to carry out wildlife conservation. Eligible projects include: identifications of the significant problems that may adversely affect fish and wildlife species and their significant habitats; actions to conserve fish and wildlife species and their habitats; and actions of which the principal purpose is to provide opportunities for the public to use and enjoy fish and wildlife through nonconsumptive activities.

## Conservation Reserve Program



<b>Overview</b>	CRP is a voluntary program that offers long-term rental payments and cost-share assistance to establish long-term resource conserving cover on environmentally sensitive cropland or, in some cases, marginal pasture land. The protective cover reduces soil erosion, improves water quality, and enhances or establishes wildlife habitat. Enrollment is based on a competitive environmental benefits index.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Land must be owned or operated for at least 12 months.</li> <li>• Individuals, partnerships, associations, Indian Tribal venture corporations, estates, trusts, other business enterprises or other legal entities, a State, State political subdivisions, States or local agencies owning or operating land might be eligible to participate.</li> <li>• Land must have minimum acceptable erodibility index, be located in an approved conservation priority area, have evidence of scour erosion damage, be a cropped wetland or cropland associated with noncropped wetlands, be land enrolled in the Water Bank Program (WBP) in the last year of the WBP agreement, or contain other environmentally sensitive land.</li> </ul>	
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>• Annual rental payments to participant of up to \$50,000 per fiscal year</li> <li>• Payment to participant of up to 50 percent of the cost for establishing cover</li> <li>• Incentive payments for wetland hydrology restoration equal to 25% of cost</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>• FY 96 \$1,945,507,000</li> <li>• FY 97 \$1,773,763,000</li> <li>• FY 98 \$1,927,826,000 (estimated)</li> </ul>	
<b>Legislative Authority</b>	Authorized by the Food Security Act of 1985, Title XII, P.L. 99-198, as amended. Enrollment authority extended by the Federal Agriculture Improvement and Reform Act of 1996.	
<b>Contacts</b>	<b>Address</b> <b>Telephone</b> <b>E-mail</b> <b>Internet</b>	Contact local or State FSA office (Appendix A) Headquarters: U.S. Department of Agriculture, Farm Service Agency, Conservation Reserve Prog. Specialist Stop 0513, Washington, D.C. 20250-0513 (202) 720-6221 info@fsa.usda.gov <a href="http://www.fsa.usda.gov/pas/prgfact.htm">http://www.fsa.usda.gov/pas/prgfact.htm</a>
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>• Cat. of Fed. Domest. Asst.</li> <li>• Farm Service Agency</li> </ul>	<a href="http://aspe.os.dhhs.gov/cfda/p10069.htm">http://aspe.os.dhhs.gov/cfda/p10069.htm</a> <a href="http://www.fsa.usda.gov">http://www.fsa.usda.gov</a>
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>• Emergency Conservation Program (page 14)</li> <li>• Wetlands Reserve Program (page 55)</li> <li>• Environmental Quality Incentives Program (page 43)</li> </ul>	



## Wildlife Habitat Incentives Program



### Overview

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat on private lands. It provides both technical assistance and cost sharing to help establish and improve fish and wildlife habitat. Participants work with USDA's Natural Resources Conservation Service to prepare a wildlife habitat development plan in consultation with the local conservation district. The plan describes the landowner's goals for improving wildlife habitat, includes a list of practices and schedule for installing them, and details the steps necessary to maintain the habitat for the life of the agreement.

### Eligibility

- Individuals must own or have control of the land under consideration, and cannot have the land already enrolled in programs that have a wildlife focus, such as the Wetlands Reserve Program, or use the land for mitigation.

### Assistance Provided

- Cost-share assistance: USDA pays up to 75 percent of the cost of installing wildlife practices
- Technical assistance for successfully establishing habitat development projects

### Funding Level

- \$50 million will be made available through FY 02

### Legislative Authority

- 1996 Farm Bill

### Contacts

*Address* Contact local or State NRCS office (Appendix A)  
 Headquarters: Department of Agriculture  
 Natural Resources Conservation Service  
 P.O. Box 2890, Washington, D.C. 20013-2890

*Telephone* (202) 720-3534

*E-mail* Please contact by telephone or mail

*Internet* <http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/ProgFact.html>

### Related Web Sites

- 1996 Farm Bill <http://www.usda.gov/farmbill/cons.html>
- Cat. of Fed. Domest. Asst. <http://aspe.os.dhhs.gov/cfda/p10914.htm>

### Related Programs

- Conservation Reserve Program (page 13)
- Wetlands Reserve Program (page 55)

## Partners for Wildlife Habitat Restoration Program



<b>Overview</b>	The Partners for Wildlife Program provide technical and financial assistance to private landowners through voluntary cooperative agreements in order to restore formerly degraded wetlands, native grasslands, riparian areas, and other habitats to conditions as natural as feasible. Under cooperative agreements, private landowners agree to maintain restoration projects as specified in the agreement but otherwise retain full control of the land. To date, the Partners for Wildlife Program has restored over 360,000 acres of wetlands, 128,000 acres of prairie grassland, 930 miles of riparian habitat, and 90 miles of in-stream aquatic habitat.		
<b>Eligibility</b>	<ul style="list-style-type: none"><li>• Private landowners (must enter into a cooperative agreement for a fixed term of at least 10 years)</li></ul>		
<b>Assistance Provided</b>	<ul style="list-style-type: none"><li>• Project grants (Cooperative Agreements)</li><li>• Program's goal is that no more than 60 percent of project cost is paid by Federal monies (Program seeks remainder of cost share from landowners and nationally-based and local entities)</li></ul>		
<b>Funding Level</b>	<ul style="list-style-type: none"><li>• FY 96 \$ 10,343,000</li><li>• FY 97 \$ 12,500,000</li><li>• FY 98 \$ 12,600,000 (estimated)</li></ul>		
<b>Legislative Authority</b>	<ul style="list-style-type: none"><li>• Fish and Wildlife Act of 1956, 16 U.S.C. 742(a)-754</li><li>• Fish and Wildlife Coordination Act, 16 U.S.C. 661-667(e)</li></ul>		
<b>Contacts</b>	<i>Address</i>	Department of the Interior U.S. Fish and Wildlife Service Branch of Habitat Restoration 4401 N. Fairfax Drive, Room 400 Arlington, VA 22203	
	<i>Telephone</i>	(703) 358-2201	
	<i>E-mail</i>	Please contact by telephone or mail	
	<i>Internet</i>	<a href="http://www.r6.fws.gov/PFW/index.html">http://www.r6.fws.gov/PFW/index.html</a>	
<b>Related Web Site</b>	<ul style="list-style-type: none"><li>• USFWS <a href="http://www.fws.gov">http://www.fws.gov</a></li></ul>		
<b>Related Programs</b>	<ul style="list-style-type: none"><li>• Wetlands Reserve Program (page 55)</li><li>• Conservation Reserve Program (page 13)</li></ul>		

## Wildlife Conservation and Appreciation Program



### Overview

The Wildlife Conservation and Appreciation Program provides grants to fund projects that bring together USFWS, State agencies, and private organizations and individuals. Projects include identification of significant problems that can adversely affect fish and wildlife and their habitats; actions to conserve species and their habitats; actions that will provide opportunities for the public to use and enjoy fish and wildlife through nonconsumptive activities; monitoring of species; and identification of significant habitats.

### Eligibility

- State fish and wildlife agencies

### Assistance Provided

- Project grants

### Funding Level

- FY 96 \$756,763
- FY 97 \$1,663,196
- FY 98 \$768,000 (estimated)

### Legislative Authority

- Partnerships for Wildlife Act, Title VII, Section 7105(g), P.L. 102-587; 106 Stat. 5098; 16 U.S.C. 3741

### Contacts

*Address* Contact your Regional office (Appendix A)  
 Department of Interior  
 U.S. Fish and Wildlife Service  
 Division of Federal Aid  
 4401 N. Fairfax Dr.  
 Arlington, VA 22203

*Telephone* (703) 358-2156

*E-mail* Please contact by telephone or mail

*Internet* <http://aspe.os.dhhs.gov/cfdw/p15617.htm>

### Related Web Site

- U.S. Fish and Wildlife Service <http://www.fws.gov>

### Related Programs

- Administrative Grants for Federal Aid in Sport Fish and Wildlife Restoration (page 31)
- Coastal Wetlands Planning, Protection and Restoration (page 56)

## Sustainable Development Challenge Grants



<b>Overview</b>	Grants are intended to initiate community-based projects that promote environmentally and economically sustainable development. The program encourages partnering among community, business, and government entities to work cooperatively to develop flexible, locally-oriented approaches that link environmental management and quality of life activities with sustainable development and revitalization. This program challenges communities to invest in a sustainable future that will link environmental protection, economic prosperity, and community well-being. These grants are intended to (1) catalyze community-based projects; (2) build partnerships which increase a community's capacity to take steps to ensure long term ecosystem and human health, economic vitality, and community well-being; and (3) leverage public and private investments to enhance environmental quality by enabling community efforts to continue beyond the period of funding.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Nonprofit organizations and community groups</li> <li>• Federally recognized Indian Tribes, State and local governments</li> </ul>	
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>• Project grants (20 percent match required)</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>• FY 1996 \$524,000</li> <li>• FY 1997 \$5 million</li> <li>• FY 1998 \$5 million (estimated)</li> </ul>	
<b>Legislative Authority</b>	<p>Multiple authorizations, including:</p> <ul style="list-style-type: none"> <li>• Clean Water Act, Section 104(b)(3)</li> <li>• Clean Air Act, Section 103(b)(3)</li> <li>• Resource Conservation and Recovery Act, Section 8001</li> <li>• Toxics Substances Control Act, Section 10</li> <li>• Pollution Prevention Act, Section 6605</li> </ul>	
<b>Contacts</b>	<p><i>Address</i> U.S. Environmental Protection Agency Office of Air and Radiation (MC 6101) 401 M Street, SW, Washington, D.C. 20460</p> <p><i>Telephone</i> (202) 260-6812</p> <p><i>E-mail</i> phurt@epamail.epa.gov</p> <p><i>Internet</i> <a href="http://www.epa.gov/ecocommunity">http://www.epa.gov/ecocommunity</a></p>	
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>• Community-based Env. Protect. <a href="http://www.epa.gov/ecosystems">http://www.epa.gov/ecosystems</a></li> <li>• Regional Contacts <a href="http://www.epa.gov/ecosystems/contact.htm">http://www.epa.gov/ecosystems/contact.htm</a></li> <li>• Cat. Of Fed. Domest. Asst. <a href="http://aspe.os.dhhs.gov/cfda/p66651.htm">http://aspe.os.dhhs.gov/cfda/p66651.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>• Environmental Justice to Small Community Groups (page 28)</li> <li>• Brownfields Economic Redevelopment Initiative (page 22)</li> </ul>	

## Environmental Justice Grants to Small Community Groups



<b>Overview</b>	This grant program provides financial assistance to community-based organizations and Tribal governments to support projects to design, demonstrate or disseminate practices, methods or techniques related to environmental justice. Grants may be used for (1) education and awareness programs; (2) environmental justice programs (e.g., river monitoring and pollution prevention); (3) technical assistance in accessing available public information; and (4) technical assistance with gathering and interpreting existing environmental justice data.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Community-based nonprofit organizations (i.e., grassroots groups, churches)</li> <li>• Federally-recognized Indian Tribes</li> </ul> <i>Organizations must be incorporated to apply</i>	
<b>Assistance Provided</b>	Office of Environmental Justice provides funds to EPA regional offices which, in turn, select and award grants up to \$20,000.	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>• FY 1996 \$3 million</li> <li>• FY 1997 \$3 million</li> <li>• FY 1998 \$2 million (estimated)</li> </ul>	
<b>Legislative Authority</b>	Multiple authorizations, including: <ul style="list-style-type: none"> <li>• Clean Water Act, Section 104(b)(3)</li> <li>• Safe Drinking Water Act, Section 1442(b)(3)</li> </ul>	
<b>Contacts</b>	<b>Address</b> U.S. Environmental Protection Agency Office of Environmental Justice (2201A) 401 M Street, SW, Washington, D.C. 20460  <b>Telephone</b> (202) 564-2515 <b>Hotline</b> (800) 962-6215 <b>E-mail</b> environmental-justice-epa@epamail.epa.gov <b>Internet</b> <a href="http://es.inel.gov/oeca/oejbut.html">http://es.inel.gov/oeca/oejbut.html</a>	
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>• Application Guidance <a href="http://es.inel.gov/oeca/oej/sm97.pdf">http://es.inel.gov/oeca/oej/sm97.pdf</a></li> <li>• FY 96 Award Recipients <a href="http://es.inel.gov/oeca/96smallgr.html">http://es.inel.gov/oeca/96smallgr.html</a></li> <li>• Cat. of Fed. Domest. Asst. <a href="http://aspe.os.dhhs.gov/cfda/p66604.htm">http://aspe.os.dhhs.gov/cfda/p66604.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>• Environmental Justice Through Pollution Prevention Grant Program (page 29)</li> <li>• Environmental Justice Community/University Partnership Grants Program (page 27)</li> </ul>	

## Cooperative Forestry Assistance Program



<b>Overview</b>	Cooperative Forestry Assistance helps State Foresters or equivalent agencies with forest stewardship programs on private, State, local, and other non-Federal forest and rural lands, plus rural communities and urban areas. This assistance is provided through the following programs: Forest Stewardship Program, Stewardship Incentive Program, Economic Action Programs, Urban and Community Forestry Program, Cooperative Lands Forest Health Protection Program, and Cooperative Lands Fire Protection Program. These programs help to achieve ecosystem health and sustainability by improving wildlife habitat, conserving forest land, reforestation, improving soil and water quality, preventing and suppressing damaging insects and diseases, wildfire protection, expanding economies of rural communities, and improving urban environments.		
<b>Eligibility</b>	<ul style="list-style-type: none"><li>• State Forester or equivalent State agency can receive monies.</li><li>• State agency can provide these monies to owners of non-Federal lands; rural communities, urban/municipal governments, nonprofit organizations, and State, local, and private agencies acting through State Foresters or equivalent.</li></ul>		
<b>Assistance Provided</b>	<ul style="list-style-type: none"><li>• Formula grants, project grants, cost share</li><li>• Use of property and facilities</li></ul>		
<b>Funding Level</b>	<ul style="list-style-type: none"><li>• FY 96 \$136,833,000</li><li>• FY 97 \$155,461,000</li><li>• FY 98 \$156,408,000</li></ul>		
<b>Legislative Authority</b>	<ul style="list-style-type: none"><li>• Cooperative Forestry Assistance Act of 1978, P.L. 95-313; Forestry Title of the Food, Agriculture, Conservation and Trade Act of 1990, as amended</li></ul>		
<b>Contacts</b>	<i>Address</i>	Contact your local State Forestry Office or local or regional USDA Forest Service Office (Appendix A) Headquarters: U.S. Department of Agriculture Forest Service, State and Private Forestry P.O. Box 96090, Washington, D.C. 20090-6090	
	<i>Telephone</i>	(202) 205-1657	
	<i>E-mail</i>	Please contact by telephone or mail	
	<i>Internet</i>	<a href="http://aspe.os.dhhs.gov/cfda/p10664.htm">http://aspe.os.dhhs.gov/cfda/p10664.htm</a>	
<b>Related Web Site</b>	<ul style="list-style-type: none"><li>• Forest Service <a href="http://www.fs.fed.us/">http://www.fs.fed.us/</a></li></ul>		
<b>Related Programs</b>	<ul style="list-style-type: none"><li>• Environmental Quality Incentives Program (page 43)</li><li>• Forestry Incentives Program (page 34)</li><li>• Wildlife Conservation and Appreciation (page 19)</li></ul>		

## Forestry Incentives Program



<b>Overview</b>	The Forestry Incentives Program (FIP) is intended to ensure the Nation's ability to meet future demand for sawtimber, pulpwood, and quality hardwoods. FIP provides cost share monies (up to 65 percent of total cost) to help with the costs of tree planting, timber stand improvements, and related practices on nonindustrial private forest lands. In addition to ensuring a future supply of timber, FIP's forest maintenance and reforestation provides numerous natural resource benefits, including reduced soil erosion and wind and enhanced water quality and wildlife habitat.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Private landowner of at least 10 acres and no more than 1,000 acres of nonindustrial forest or other suitable land. Individuals, groups, Indian Tribes or other native groups, associations, and corporations whose stocks are not publicly traded might be eligible provided they are not primarily engaged in the business of manufacturing forest products or providing public utility services.</li> <li>• Land must be suitable for conversion from nonforest to forest land, for reforestation, or for improved forest management. Land must be capable of producing marketable timber crops and meets productivity standards.</li> </ul>	
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>• FIP provides no more than 65 percent of the total costs, with a maximum of \$10,000 per person per year</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>• FY 96 \$6,325,000</li> <li>• FY 97 \$6,325,000</li> <li>• FY 98 \$6,325,000 (estimated)</li> </ul>	
<b>Legislative Authority</b>	<ul style="list-style-type: none"> <li>• Cooperative Forestry Assistance Act of 1978, P.L. 95-313</li> <li>• 1996 Farm Bill</li> </ul>	
<b>Contacts</b>	<i>Address</i>	Contact local or State NRCS office (Appendix A) Headquarters: Department of Agriculture Natural Resources Conservation Service P.O. Box 2890, Washington, D.C. 20013
	<i>Telephone</i>	(202) 720-1871
	<i>E-mail</i>	jmcullen@usda.gov
	<i>Internet</i>	<a href="http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/FIPfact.html">http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/FIPfact.html</a>
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>• 1996 Farm Bill Provisions <a href="http://www.usda.gov/farmbill/cons.html">http://www.usda.gov/farmbill/cons.html</a></li> <li>• Cat. of Fed. Domest. Asst. <a href="http://aspe.os.dhhs.gov/cfda/p10064.htm">http://aspe.os.dhhs.gov/cfda/p10064.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>• Cooperative Forestry Assistance (page 33)</li> <li>• Environmental Quality Incentives Program (page 43)</li> </ul>	

## Watershed Protection and Flood Prevention Program



NRCS

### Overview

This program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Technical and financial assistance is available for installation of works of improvement to protect, develop, and utilize the land and water resources in small watersheds.

### Eligibility

- Local or State agency, county, municipality, town or township, soil and water conservation district, flood prevention or flood control district, Indian Tribe or Tribal organization, or nonprofit agency with authority to carry out, maintain, and operate watershed improvement works

### Assistance Provided

- Cost-sharing (funds cover 100 percent of flood prevention construction costs; 50 percent of construction costs related to agricultural water management, recreation and fish and wildlife; and none of the costs for other municipal and industrial water management.)
- Technical assistance and counseling

### Funding Level

- FY 96 \$100 million
- FY 97 \$100 million
- FY 98 \$40 million estimated financial assistance (technical assistance is proposed to be funded under a different program)

### Legislative Authority

- Watershed Protection and Flood Prevention Act, P.L. 83-566, as amended and P.L. 78-534

### Contacts

*Address* Contact local or State NRCS office (Appendix A)  
Headquarters: Department of Agriculture  
Natural Resources Conservation Service, P.O. Box 2890  
Washington, D.C. 20013

*Telephone* (202) 720-3527

*E-mail* Please contact by telephone or mail

*Internet* <http://aspe.os.dhhs.gov/cfda/p10904.htm>

### Related Web Sites

- Fact sheets <http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/ProgFact.html>  
<http://www.ftw.nrcs.usda.gov/programs.html>

### Related Programs

- Nonpoint Source Implementation Grants (page 51)
- Environmental Quality Incentives Program (page 43)



## Capitalization Grants for Clean Water State Revolving Funds

<b>Overview</b>	EPA awards grants to States to capitalize their Clean Water State Revolving Funds (SRFs). The States, through the SRF, make loans for high priority water quality activities. As loan recipients make payments back into the fund, money is available for new loans to be issued to other recipients. While traditionally used to build wastewater treatment facilities, loans are used increasingly for other water quality management activities, including: (1) agricultural, silviculture, rural and urban runoff control; (2) estuary improvement projects; (3) wet weather flow control, including stormwater and sewer overflows; (4) alternative wastewater treatment technologies; and (5) nontraditional projects such as landfills and riparian buffers.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Capitalization grant funds available to States, Puerto Rico, Territories, and D.C.</li> <li>• States lend money to municipalities, communities, citizens' groups; nonprofit organizations; and private citizens implementing NPS and estuary management activities (provided for in State plans developed under CWA Sections 319 and 320.)</li> </ul>	
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>• Loans provided by States to eligible recipients</li> <li>• 20 percent State match is required</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>• FY 96 \$2 billion</li> <li>• FY 97 \$625 million</li> <li>• FY 98 \$1.075 billion (estimated)</li> </ul>	
<b>Legislative Authority</b>	<ul style="list-style-type: none"> <li>• Clean Water Act, Section 601-607, P.L. 95-217, as amended</li> </ul>	
<b>Contacts</b>	<i>Address</i> U.S. Environmental Protection Agency, Office of Wastewater Management, SRF Branch, Municipal Support Division (4204) 401 M Street, SW, Washington, D.C. 20460 <i>Telephone</i> (202) 260-2268 <i>E-mail</i> srfinfo@epamail.epa.gov <i>Internet</i> <a href="http://www.epa.gov/owm">http://www.epa.gov/owm</a>	
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>• CWSRF State contacts <a href="http://www.epa.gov/efinpage/srfcon.htm">http://www.epa.gov/efinpage/srfcon.htm</a></li> <li>• Cat. of Fed. Domest. Asst. <a href="http://aspe.os.dhhs.gov/cfda/p66458.htm">http://aspe.os.dhhs.gov/cfda/p66458.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>• Capitalization Grants for Drinking Water SRF (page 48)</li> <li>• Nonpoint Source Implementation Grants (page 51)</li> <li>• Pollution Prevention Grants Program (page 52)</li> <li>• Hardship Grants Program for Rural Communities (page 50)</li> </ul>	

## Nonpoint Source Implementation Grants (319 Program)

<b>Overview</b>	The 319 program provides formula grants to the States to implement nonpoint source projects and programs in accordance with Section 319 of the Clean Water Act. Examples of previously-funded projects include best management practices (BMPs) installation for animal waste; design and implementation of BMP systems for stream, lake, and estuary watersheds; and basin-wide landowner education programs; and lake projects previously funded under the CWA Section 314 Clean Lakes Program.	
<b>Eligibility</b>	<i>Applicant</i>	<ul style="list-style-type: none"> <li>States and Indian Tribes;</li> </ul>
	<i>Beneficiary</i>	<ul style="list-style-type: none"> <li>State and local governments; Indian Tribes</li> <li>Nonprofit organizations (may submit applications to States for funds in accordance with the State's work program)</li> </ul>
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>Formula grants are awarded to a lead agency in each State</li> <li>States/local organizations are required to provide 40 percent of total project or program cost</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>FY 1996 \$100 million</li> <li>FY 1997 \$100 million</li> <li>FY 1998 \$100 million (estimated)</li> </ul>	
<b>Legislative Authority</b>	<ul style="list-style-type: none"> <li>Clean Water Act, Section 319(h)</li> </ul>	
<b>Contacts</b>	<i>Address</i>	U.S. Environmental Protection Agency Office of Wetlands, Oceans and Watersheds Assessment and Watershed Protection Division Nonpoint Source Control Branch (4503F) 401 M Street, SW, Washington, D.C. 20460
	<i>Telephone</i>	(202) 260-7100
	<i>E-mail</i>	ow-general@epamail.epa.gov
	<i>Internet</i>	<a href="http://www.epa.gov/owow/NPS">http://www.epa.gov/owow/NPS</a>
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>Section 319 CWA <a href="http://www.epa.gov/owow/NPS/sec319cwa.html">http://www.epa.gov/owow/NPS/sec319cwa.html</a></li> <li>Program guidance <a href="http://www.epa.gov/owow/NPS/guide.html">http://www.epa.gov/owow/NPS/guide.html</a></li> <li>Cat. of Fed. Dom. Assist. <a href="http://aspe.os.dhhs.gov/cfda/p66460.htm">http://aspe.os.dhhs.gov/cfda/p66460.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>Pollution Prevention Grants Program (p. ge 52)</li> <li>Capitalization Grants for Clean Water S&amp;RF (page 47)</li> <li>Environmental Quality Incentives Program (page 43)</li> </ul>	

## Pollution Prevention Grants Program



<b>Overview</b>	This grant program provides project grants to States to implement pollution prevention projects. The grant program is focused on institutionalizing multimedia pollution (air, water, land) prevention as an environmental management priority, establishing prevention goals, providing direct technical assistance to businesses, conducting outreach, and collecting and analyzing data.	
<b>Eligibility</b>	<i>Applicant</i>	<ul style="list-style-type: none"> <li>• States</li> <li>• Indian Tribes</li> </ul>
	<i>Beneficiary</i>	<ul style="list-style-type: none"> <li>• State and local governments</li> <li>• Indian Tribes</li> <li>• Nonprofit organizations</li> </ul> <p>(Local governments and nonprofit agencies, while not eligible to submit applications directly, are encouraged to work with State agencies to implement pollution prevention programs.)</p>
<b>Assistance Provided</b>		<ul style="list-style-type: none"> <li>• Individual grants are awarded based on requests</li> <li>• States are required to provide at least 50 percent of total project costs</li> </ul>
<b>Funding Level</b>		<ul style="list-style-type: none"> <li>• FY 1996 \$5 million</li> <li>• FY 1997 \$6 million</li> <li>• FY 1998 \$6 million (estimated)</li> </ul>
<b>Legislative Authority</b>		<ul style="list-style-type: none"> <li>• Pollution Prevention Act, Section 6605</li> </ul>
<b>Contacts</b>	<i>Address</i>	U.S. Environmental Protection Agency Office of Pollution Prevention and Toxics Pollution Prevention Division (7409) 401 M Street, SW, Washington, D.C. 20460
	<i>Telephone</i>	(202) 260-3480
	<i>E-mail</i>	kent.christopher@epamail.epa.gov
	<i>Internet</i>	<a href="http://www.epa.gov/internet/oppts">http://www.epa.gov/internet/oppts</a>
<b>Related Web Sites</b>		<ul style="list-style-type: none"> <li>• Pollution Prevention <a href="http://www.epa.gov/opptintr/p2home/">http://www.epa.gov/opptintr/p2home/</a></li> <li>• Pollution Prev. Act <a href="http://www.epa.gov/opptintr/p2home/uscode.htm">http://www.epa.gov/opptintr/p2home/uscode.htm</a></li> <li>• Cat. of Fed. Dom. Assist. <a href="http://aspe.c.s.dhhs.gov/cfda/p66708.htm">http://aspe.c.s.dhhs.gov/cfda/p66708.htm</a></li> </ul>
<b>Related Programs</b>		<ul style="list-style-type: none"> <li>• Nonpoint Source Implementation Grant: (page 51)</li> <li>• Environmental Justice through Pollution Prevention Grants (page 29)</li> <li>• Capitalization Grants for Drinking Water SRF (page 48)</li> </ul>

## Water Quality Cooperative Agreements



<b>Overview</b>	Grants are provided to support the creation of unique and new approaches to meeting stormwater, combined sewer outflows, sludge, and pretreatment requirements as well as enhancing State capabilities. Eligible projects include research, investigations, experiments, training, demonstrations, surveys, and studies related to the causes, effects, extent, and prevention of pollution.		
<b>Eligibility</b>	<ul style="list-style-type: none"><li>• State water pollution control agencies, interstate agencies, local public agencies, Indian Tribes, nonprofit institutions, organizations, and individuals</li></ul>		
<b>Assistance Provided</b>	<ul style="list-style-type: none"><li>• Grants</li><li>• Match is encouraged</li></ul>		
<b>Funding Level</b>	<ul style="list-style-type: none"><li>• FY 1997 \$20 million</li><li>• FY 1998 \$20 million (estimated)</li></ul>		
<b>Legislative Authority</b>	<ul style="list-style-type: none"><li>• Clean Water Act, Section 104(b)(3)</li></ul>		
<b>Contacts</b>	<i>Address</i>	U.S. Environmental Protection Agency Office of Wastewater Management (4203) 401 M Street, SW, Washington, D.C. 20460	
	<i>Telephone</i>	(202) 260-9545	
	<i>E-mail</i>	ow-general@epamail.epa.gov	
	<i>Internet</i>	<a href="http://www.epa.gov/owm/wm042000.htm">http://www.epa.gov/owm/wm042000.htm</a>	
<b>Related Web Site</b>	<ul style="list-style-type: none"><li>• State Revolving Fund</li></ul>	<a href="http://www.epa.gov/owm">http://www.epa.gov/owm</a>	
<b>Related Programs</b>	<ul style="list-style-type: none"><li>• Surface Transportation Program (page 45)</li><li>• Capitalization Grants for Clean Water SRF (page 47)</li></ul>		

## Wetlands Reserve Program



NRCS

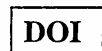
<b>Overview</b>	The Wetlands Reserve Program (WRP) is a voluntary program to restore and protect wetlands on private property. WRP provides landowners with financial incentives to enhance wetlands in exchange for retiring marginal agricultural land. Landowners may sell a conservation easement or enter into a cost-share restoration agreement. Landowners voluntarily limit future use of the land, yet retain private ownership. Landowners and the NRCS develop a plan for the restoration and maintenance of the wetland.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>Easement participant must have owned the land for at least 1 year. Owner can be an individual, partnership, association, corporation, estate, trust, business or other legal entities, a State (when applicable), political subdivision of a State, or any agency thereof owning private land.</li> <li>Land must be restorable and be suitable for wildlife benefits.</li> </ul>	
<b>Assistance Provided</b>	<p>WRP provides three options to the landowner:</p> <ul style="list-style-type: none"> <li><i>Permanent Easement:</i> USDA purchases easement (price is lessor of land value or payment cap.) USDA pays 100 percent of restoration costs.</li> <li><i>30-year Easement:</i> Payment will be 75 percent of what would be paid for a permanent easement. USDA pays 75 percent of restoration costs.</li> <li><i>Restoration Cost Share Agreement:</i> Agreement (min. 10 yr.) to restore degraded wetland habitat. USDA pays 75 percent of restoration costs.</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>FY 96 \$77 million</li> <li>FY 97 \$106 million</li> <li>FY 98 \$163 million (estimated)</li> </ul>	
<b>Legislative Authority</b>	<ul style="list-style-type: none"> <li>Food Security Act of 1985, Title XII, P.L. 99-198, as amended</li> <li>1996 Farm Bill</li> </ul>	
<b>Contacts</b>	<i>Address</i>	Contact local or State NRCS office (Appendix A) Headquarters: Department of Agriculture, Natural Resources Conservation Service, Watersheds and Wetlands Division, P.O. Box 2890, Washington, D.C. 20013
	<i>Telephone</i>	(202) 690-0848
	<i>E-mail</i>	robert.misso@usda.gov
	<i>Internet</i>	<a href="http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/WetRule.html">http://www.nhq.nrcs.usda.gov/OPA/FB96OPA/WetRule.html</a>
<b>Related Web Site</b>	<ul style="list-style-type: none"> <li>Farm Bill Provisions <a href="http://www.usda.gov/farmbill/cons.htm">http://www.usda.gov/farmbill/cons.htm</a></li> <li>Cat. of Fed. Domestic Assistance <a href="http://aspe.os.dhhs.gov/cfda/p10072.htm">http://aspe.os.dhhs.gov/cfda/p10072.htm</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>Conservation Reserve Program (page 13)</li> <li>Watershed Protection and Flood Prevention Program (page 44)</li> </ul>	

## Coastal Wetlands Planning, Protection and Restoration Act



<b>Overview</b>	This program, also known as National Coastal Wetlands Conservation Grants, provides funds to assist States in pursuing coastal wetland conservation projects. Funds can be used for acquisition of interests in coastal lands or waters, and for restoration, enhancement, or management of coastal wetland ecosystems on a competitive basis with all coastal States. Eligible programs will provide for long-term conservation of such lands or waters and the hydrology, water quality, and fish and wildlife.		
<b>Eligibility</b>	<ul style="list-style-type: none"><li>• All States bordering on the Atlantic, Gulf (except LA), and Pacific coasts, Great Lakes, as well as Puerto Rico, Virgin Islands, Guam, the Commonwealth of the N. Mariana Islands, the Trust Territories of the Pacific Islands, and America Samoa.</li></ul>		
<b>Assistance Provided</b>	<ul style="list-style-type: none"><li>• Project grants</li><li>• Federal share of costs not to exceed 50 percent; Federal share may be increased to 75 percent if a coastal State has established a fund (1) for the acquisition of coastal wetlands, other natural areas, or open spaces, or (2) derived from a dedicated recurring source of monies.</li></ul>		
<b>Funding Level</b>	<ul style="list-style-type: none"><li>• FY 96 \$1,510,000</li><li>• FY 97 \$15,175,204</li><li>• FY 98 \$9,400,000 (estimated)</li></ul>		
<b>Legislative Authority</b>	<ul style="list-style-type: none"><li>• Coastal Wetlands, Planning, Protection and Restoration Act, Sec. 305, Title III, P.L.101-646, 16 U.S.C. 3954</li></ul>		
<b>Contacts</b>	<i>Address</i>	Contact your State or regional office (Appendix A) Headquarters: Department of the Interior Fish and Wildlife Service Division of Federal Aid, 1951 Constitution Ave., NW Washington, D.C. 20240	
	<i>Telephone</i>	(703) 358-1845	
	<i>E-mail</i>	robert_pacific@mail.fws.gov	
	<i>Internet</i>	http://www.fws.gov/~r9fedaid/grants/cwa.html	
<b>Related Web Site</b>	<ul style="list-style-type: none"><li>• Cat. of Fed. Dom. Asst. <a href="http://aspe.os.dhhs.gov/cfda/p15614.htm">http://aspe.os.dhhs.gov/cfda/p15614.htm</a></li></ul>		
<b>Related Programs</b>	<ul style="list-style-type: none"><li>• Chesapeake Bay Program (page 9)</li><li>• National Estuary Program (page 10)</li><li>• North American Wetlands Conservation Act Grant Program (page 57)</li><li>• Wetlands Protection Development Grants (page 58)</li></ul>		

## North American Wetlands Conservation Act Grant Program



<b>Overview</b>	The North American Wetlands Conservation Act (NAWCA) grant program promotes long-term conservation of North American wetland ecosystems, and the waterfowl and other migratory birds, fish and wildlife that depend upon such habitat. Principal conservation actions supported by NAWCA are acquisition, enhancement and restoration of wetlands and wetlands-associated habitat. The program encourages voluntary, public-private partnerships to conserve North American wetland ecosystems by creating an infrastructure and providing a source of funding.	
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>Public or private, profit or nonprofit entities or individuals establishing public-private sector partnerships</li> </ul>	
<b>Assistance Provided</b>	<ul style="list-style-type: none"> <li>Project grants (cooperative agreements and contracts)</li> <li>Cost-share partners must at least match grant funds 1:1 with U.S. non-Federal dollars</li> </ul>	
<b>Funding Level</b>	<ul style="list-style-type: none"> <li>FY 96 \$30 million</li> <li>FY 97 \$40 million</li> <li>FY 98 \$40 million (estimated)</li> </ul>	
<b>Legislative Authority</b>	<ul style="list-style-type: none"> <li>1989 North American Wetlands Conservation Act, as amended</li> <li>Coastal Wetlands, Planning, Protection, and Restoration Act, as amended</li> </ul>	
<b>Contacts</b>	<i>Address</i>	Department of the Interior U.S. Fish and Wildlife Service North American Waterfowl and Wetlands Office 4401 N. Fairfax Drive, Room 110 Arlington, VA 22203
	<i>Telephone</i>	(703) 358-1784
	<i>E-mail</i>	r9arw_nawwo@mail.fws.gov
	<i>Internet</i>	<a href="http://www.fws.gov/~r9nawwo/nawcahp.html">http://www.fws.gov/~r9nawwo/nawcahp.html</a>
<b>Related Web Sites</b>	<ul style="list-style-type: none"> <li>USFWS <a href="http://www.fws.gov">http://www.fws.gov</a></li> <li>USFWS Region 9 <a href="http://www.fws.gov/~r9nawwo/homepag.html">http://www.fws.gov/~r9nawwo/homepag.html</a></li> </ul>	
<b>Related Programs</b>	<ul style="list-style-type: none"> <li>Partners for Wildlife Habitat Restoration Program (page 18)</li> <li>Wetlands Reserve Program (page 55)</li> </ul>	

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## Farm Service Agency

Six programs were identified that are administered by the Farm Service Agency.

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### Agricultural Conservation Program

Authorized by the Soil Conservation and Domestic Allotment Act of 1936, Sections 7 to 15, 16(a), 16(f), and 17, as amended; Agricultural Act of 1970, as amended; Agriculture and Consumer Protection Act of 1973, as amended; Food and Agriculture Act of 1977, as amended, Section 1501, Public Law 95-113; Energy Security Act of 1980, Section 259, Public Law 96-294.

Section 334 of the 1996 Farm Bill combines the functions of this program with the Colorado River Basin Salinity Control Program, Great Plains Conservation Program, and the Water Quality Incentives Program, to form the Environmental Quality Incentives Program. Accordingly, the Agricultural Conservation Program will lapse as of September 30, 1996.

**Purpose(s).** To control erosion and sedimentation, encourage voluntary compliance with federal and state requirements to solve point and nonpoint source pollution (point source pollution is traceable to a discrete source such as a pipe or other conveyance, while nonpoint pollution is not traceable to a specific point of origin), and improve water quality, among other objectives.

**Assistance provided and limitations.** Direct cost-share payments generally limited to 50 percent of the cost of installing approved conservation practices, technical/engineering support, and education. Program operates in conjunction with the Soil and Water Conservation Program, and payments are subject to a yearly cap of \$3,500 per applicant, or \$35,000 under 10 year agreements.

**Eligible recipients and eligibility requirements.** All farmers, ranchers, owners, landlords, tenants, sharecroppers, and associated groups who bear part of the cost to implement an approved conservation practice in the 50 states, Guam, Puerto Rico, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands.

Applicants must identify conservation need(s) and proposed corrective measure(s) that are within conservation priorities set by the county Farm Service Agency committee. Proposed corrective measure(s) must conform to conservation practices identified as appropriate by the local Soil and Water Conservation District.

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**Contact point(s).** U.S. Department of Agriculture, Farm Service Agency, Agricultural Conservation Program Specialist, USDA/FSA/DAFP/CPB, Washington, D.C. 20013. Telephone: (202) 690-0671. Fax: (202) 720-4619. E-mail: CFURUKAW@sies.wsc.ag.gov.

After September 30, 1996, contact county offices of the Farm Service Agency or the Natural Resources Conservation Service.



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## Forest Service

One Forest Service program was identified.

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### Stewardship Incentive Program

This program was authorized by the Food, Agriculture, Conservation and Trade Act of 1990.

**Purpose(s)**. To encourage private landowners to manage their forest land in ways that improve water quality, including tree planting and the implementation of best management practices for stream crossings and streamside management.

**Assistance provided and limitations**. Direct payments, technical/engineering support, and education. Federal cost share cannot exceed 75 percent of the total cost, with a maximum of \$10,000 per applicant, per fiscal year.

**Eligible recipients and eligibility requirements**. Nonindustrial private landowners. Ownership of less than 1,000 acres and willingness to implement a stewardship plan.

**Contact point(s)**. State forestry agencies and state foresters.

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### Construction Program

Authorized by Reclamation Act of 1902, as amended.

**Purpose(s)**. To provide funding and assistance for the implementation of structural and operational measures to improve water management.

**Assistance provided and limitations**. Grants, studies, technical/engineering support, and research. Reimbursement requirements and repayment arrangements are determined on a case-by-case basis, depending on the federal role/responsibility under the given activity.

**Eligible recipients and eligibility requirements**. State, local, and tribal governments. Congressional authority and appropriations must be secured.

**Contact point(s)**. Bureau of Reclamation, Director, Technical Service Center, D-8000, Denver Federal Center, Denver, Colorado 80225. Telephone: (303) 236-6985, ext. 366.

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**Refuges and  
Wildlife—North American  
Waterfowl Management  
Plan**

Authorized by the North American Wetlands Conservation Act of 1989, Public Law 101-233.

**Purpose(s).** To support a strategy for cooperative public/private wetland habitat conservation that will reverse the decline in waterfowl and other wetland wildlife species in the United States, Canada, and Mexico.

**Assistance provided and limitations.** Grants. Public and private participants (partners) must contribute at least one dollar for every grant dollar received.

**Eligible recipients and eligibility requirements.** Public and private entities that agree to enter into partnership to acquire, restore, and enhance wetlands. Program/proposals must be consistent with provisions of a Canada/U.S./Mexico agreement—the North American Waterfowl Management Plan.

**Contact point(s).** U.S. Fish and Wildlife Service, Executive Director, North American Waterfowl and Wetlands Office, 4401 North Fairfax Drive, Arlington, Virginia 22203. Telephone: (703) 358-1784. Fax: (703) 358-2282. E-mail: Ken\_Williams@mail.fws.gov.

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**State Revolving Funds  
Capitalization Grants**

Authorized by the Federal Water Pollution Control Act, as amended.

**Program purpose(s).** To provide a long-term source of financing to states for the construction of wastewater treatment facilities and the implementation of other water quality management activities.

**Contact point(s).** State Revolving Fund Coordinator, Environmental Protection Agency.

- Region I—Telephone: (617) 565-3617. Fax: (617) 565-9360.
- Region II—Telephone: (212) 637-3884. Fax: (212) 637-3891.
- Region III—Telephone: (215) 597-8821. Fax: (215) 597-3359.
- Region IV—Telephone: (404) 347-3633, ext. 6519. Fax: (404) 347-1798.
- Region V—Telephone: (312) 886-0174. Fax: (312) 886-0168.
- Region VI—Telephone: (214) 665-7163. Fax: (214) 665-6490.
- Region VII—Telephone: (913) 551-7741. Fax: (913) 551-7765.
- Region VIII—Telephone: (303) 312-6245. Fax: (303) 312-7084.
- Region IX—Telephone: (415) 744-1949. Fax: (415) 744-1078.
- Region X—Telephone: (206) 553-1380. Fax: (206) 553-0165.

## Water Pollution Control—State and Interstate Program Support

Authorized by Section 106 of the Federal Water Pollution Control Act, as amended.

**Purpose(s).** To assist states, territories, the District of Columbia, interstate agencies, and qualified Indian tribes in establishing and maintaining adequate measures for prevention and control of surface water and groundwater pollution.

**Assistance provided and limitations.** Grants. Funds cannot be used for construction, operation, or maintenance of wastewater treatment plants, nor can they be used for costs financed by other federal grants.

**Eligible recipients and eligibility requirements.** States, territories, the District of Columbia, interstate agencies, and Indian tribes qualified under Section 518(e) of the Federal Water Pollution Control Act. Water pollution control agencies involved must meet definitional requirements contained in the Federal Water Pollution Control Act.

**Contact point(s).** Regional Administrators, Environmental Protection Agency, Regional Offices.

- Region I—Telephone: (617) 565-3400. Fax: (617) 565-3415.
- Region II—Telephone: (212) 637-3000. Fax: (212) 637-3526.
- Region III—Telephone: (215) 597-9814. Fax: (215) 597-7906.
- Region IV—Telephone: (404) 347-4728. Fax: (404) 347-4702.
- Region V—Telephone: (312) 353-2000. Fax: (312) 353-4135.
- Region VI—Telephone: (214) 665-2100. Fax: (214) 665-6648.
- Region VII—Telephone: (913) 551-7006. Fax: (913) 551-7976.
- Region VIII—Telephone: (303) 293-1616. Fax: (303) 293-1647.
- Region IX—Telephone: (415) 744-1001. Fax: (415) 744-2499.
- Region X—Telephone: (206) 553-0479. Fax: (206) 553-1809.

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## Farm Service Agency

Six programs were identified that are administered by the Farm Service Agency.

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### Agricultural Conservation Program

Authorized by the Soil Conservation and Domestic Allotment Act of 1936, Sections 7 to 15, 16(a), 16(f), and 17, as amended; Agricultural Act of 1970, as amended; Agriculture and Consumer Protection Act of 1973, as amended; Food and Agriculture Act of 1977, as amended, Section 1501, Public Law 95-113; Energy Security Act of 1980, Section 259, Public Law 96-294.

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**Purpose(s).** To control erosion and sedimentation, encourage voluntary compliance with federal and state requirements to solve point and nonpoint source pollution (point source pollution is traceable to a discrete source such as a pipe or other conveyance, while nonpoint pollution is not traceable to a specific point of origin), and improve water quality, among other objectives.

**Assistance provided and limitations.** Direct cost-share payments generally limited to 50 percent of the cost of installing approved conservation practices, technical/engineering support, and education. Program operates in conjunction with the Soil and Water Conservation Program, and payments are subject to a yearly cap of \$3,500 per applicant, or \$35,000 under 10 year agreements.

**Eligible recipients and eligibility requirements.** All farmers, ranchers, owners, landlords, tenants, sharecroppers, and associated groups who bear part of the cost to implement an approved conservation practice in the 50 states, Guam, Puerto Rico, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands.

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**Contact point(s).** U.S. Department of Agriculture, Farm Service Agency, Agricultural Conservation Program Specialist, USDA/FSA/DAFP/CPB, Washington, D.C. 20013. Telephone: (202) 690-0671. Fax: (202) 720-4619. E-mail: CFURUKAW@sies.wsc.ag.gov.

After September 30, 1996, contact county offices of the Farm Service Agency or the Natural Resources Conservation Service.

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## Forest Service

One Forest Service program was identified.

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### Stewardship Incentive Program

This program was authorized by the Food, Agriculture, Conservation and Trade Act of 1990.

**Purpose(s).** To encourage private landowners to manage their forest land in ways that improve water quality, including tree planting and the implementation of best management practices for stream crossings and streamside management.

**Assistance provided and limitations.** Direct payments, technical/engineering support, and education. Federal cost share cannot exceed 75 percent of the total cost, with a maximum of \$10,000 per applicant, per fiscal year.

**Eligible recipients and eligibility requirements.** Nonindustrial private landowners. Ownership of less than 1,000 acres and willingness to implement a stewardship plan.

**Contact point(s).** State forestry agencies and state foresters.

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### Construction Program

Authorized by Reclamation Act of 1902, as amended.

**Purpose(s).** To provide funding and assistance for the implementation of structural and operational measures to improve water management.

**Assistance provided and limitations.** Grants, studies, technical/engineering support, and research. Reimbursement requirements and repayment arrangements are determined on a case-by-case basis, depending on the federal role/responsibility under the given activity.

**Eligible recipients and eligibility requirements.** State, local, and tribal governments. Congressional authority and appropriations must be secured.

**Contact point(s).** Bureau of Reclamation, Director, Technical Service Center, D-8000, Denver Federal Center, Denver, Colorado 80225.  
Telephone: (303) 236-6985, ext. 366.

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**Refuges and  
Wildlife—North American  
Waterfowl Management  
Plan**

Authorized by the North American Wetlands Conservation Act of 1989, Public Law 101-233.

**Purpose(s).** To support a strategy for cooperative public/private wetland habitat conservation that will reverse the decline in waterfowl and other wetland wildlife species in the United States, Canada, and Mexico.

**Assistance provided and limitations.** Grants. Public and private participants (partners) must contribute at least one dollar for every grant dollar received.

**Eligible recipients and eligibility requirements.** Public and private entities that agree to enter into partnership to acquire, restore, and enhance wetlands. Program/proposals must be consistent with provisions of a Canada/U.S./Mexico agreement—the North American Waterfowl Management Plan.

**Contact point(s).** U.S. Fish and Wildlife Service, Executive Director, North American Waterfowl and Wetlands Office, 4401 North Fairfax Drive, Arlington, Virginia 22203. Telephone: (703) 358-1784. Fax: (703) 358-2282. E-mail: Ken\_Williams@mail.fws.gov.

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**State Revolving Funds  
Capitalization Grants**

Authorized by the Federal Water Pollution Control Act, as amended.

**Program purpose(s).** To provide a long-term source of financing to states for the construction of wastewater treatment facilities and the implementation of other water quality management activities.

**Contact point(s).** State Revolving Fund Coordinator, Environmental Protection Agency.

- Region I—Telephone: (617) 565-3617. Fax: (617) 565-9360.
- Region II—Telephone: (212) 637-3884. Fax: (212) 637-3891.
- Region III—Telephone: (215) 597-8821. Fax: (215) 597-3359.
- Region IV—Telephone: (404) 347-3633, ext. 6519. Fax: (404) 347-1798.
- Region V—Telephone: (312) 886-0174. Fax: (312) 886-0168.
- Region VI—Telephone: (214) 665-7163. Fax: (214) 665-6490.
- Region VII—Telephone: (913) 551-7741. Fax: (913) 551-7765.
- Region VIII—Telephone: (303) 312-6245. Fax: (303) 312-7084.
- Region IX—Telephone: (415) 744-1949. Fax: (415) 744-1078.
- Region X—Telephone: (206) 553-1380. Fax: (206) 553-0165.

## Water Pollution Control—State and Interstate Program Support

Authorized by Section 106 of the Federal Water Pollution Control Act, as amended.

**Purpose(s)**. To assist states, territories, the District of Columbia, interstate agencies, and qualified Indian tribes in establishing and maintaining adequate measures for prevention and control of surface water and groundwater pollution.

**Assistance provided and limitations**. Grants. Funds cannot be used for construction, operation, or maintenance of wastewater treatment plants, nor can they be used for costs financed by other federal grants.

**Eligible recipients and eligibility requirements**. States, territories, the District of Columbia, interstate agencies, and Indian tribes qualified under Section 518(e) of the Federal Water Pollution Control Act. Water pollution control agencies involved must meet definitional requirements contained in the Federal Water Pollution Control Act.

**Contact point(s)**. Regional Administrators, Environmental Protection Agency, Regional Offices.

- Region I—Telephone: (617) 565-3400. Fax: (617) 565-3415.
- Region II—Telephone: (212) 637-3000. Fax: (212) 637-3526.
- Region III—Telephone: (215) 597-9814. Fax: (215) 597-7906.
- Region IV—Telephone: (404) 347-4728. Fax: (404) 347-4702.
- Region V—Telephone: (312) 353-2000. Fax: (312) 353-4135.
- Region VI—Telephone: (214) 665-2100. Fax: (214) 665-6648.
- Region VII—Telephone: (913) 551-7006. Fax: (913) 551-7976.
- Region VIII—Telephone: (303) 293-1616. Fax: (303) 293-1647.
- Region IX—Telephone: (415) 744-1001. Fax: (415) 744-2499.
- Region X—Telephone: (206) 553-0479. Fax: (206) 553-1809.

## **Section 206 "Aquatic Ecosystem Restoration"**

Section 206 of the 1996 Water Resources Development Act (WRDA).

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### **AUTHORITY AND SCOPE**

Section 206 of the 1996 Water Resources Development Act, as amended, provides authority for the Secretary to carry out an aquatic ecosystem restoration and protection project. Such projects will usually include manipulation of the hydrology in and along bodies of water, including wetlands and riparian areas. A project is adopted for construction only after a detailed investigation determines that the project will improve the quality of the environment and is in the best interest of the public, and clearly shows the engineering feasibility and economic justification of the improvement. Each project is limited to a Federal cost share of not more than \$5 million. The Federal limitation includes all project-related costs for feasibility studies, planning, engineering, construction and supervision and administration.

### **HOW TO REQUEST ASSISTANCE**

The Corps of Engineers can initiate an investigation of a prospective project upon receipt of a request from a sponsoring agency fully empowered under state law to provide the required local cooperation (see sample letter request).

### **CASH CONTRIBUTION**

If the value of the lands, easements, relocation, right-of-ways and disposals (LERRDs) plus the cash contribution does not equal or exceed 35 percent of the project cost, the sponsor must pay the additional amount necessary so that the sponsor's total contribution equals 35 percent of the project cost. The entire non-Federal share of the total project cost may be credited work-in-kind. Post feasibility phase design, including plans and specifications, provision of materials, and project construction are items eligible for work-in-kind as part of the non-Federal sponsor's share.

### **LOCAL COOPERATION**

Formal assurance of local cooperation in the form of a Project Cooperation Agreement (PCA) must be executed with the local sponsoring agency. The sponsoring agency just normally agree to the following:

- a. Provide without cost to the United States all LERRDs necessary for the construction and subsequent maintenance of the project.
- b. Provide without cost to the United States all necessary alterations of buildings, utilities, highways, bridges, sewers, and related and special facilities.
- c. Hold and save the United States free from damages due to the construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its contractors.
- d. Maintain and operate the project after completion without cost to the United States.
- e. Prevent future encroachment, which might interfere with proper functioning of the project.



- f. Assume responsibility for all costs in excess of the Federal cost limitation of \$5 million.
- g. Provide guidance and leadership in preventing unwise future development of the flood plain by use of appropriate flood plain management techniques to reduce flood losses.
- h. If the value of the sponsor's contribution above does not equal or exceed 35 percent of the project cost, provide cash contribution to make the sponsor's total contribution equal to 35 percent.

**POINT OF CONTACT**

Ms. Dorie Bollman  
U.S. Army Corps of Engineers, District of Rock Island  
Clock Tower Building - P.O. Box 2004  
Rock Island, IL 61204-2004  
(309) 794-5590 (phone); 309/794-5157 (fax)  
email: dorene.a.bollman@usace.army.mil

:010 10.765 **Watershed** Protection and Flood Prevention Loans

:030 FEDERAL AGENCY: RURAL UTILITIES SERVICE, DEPARTMENT OF AGRICULTURE

:040 AUTHORIZATION: **Watershed** Protection and Flood Prevention Act, as amended, Section 9, Public Law 83-566, 16 U.S.C. 1006a; Flood Control Act, as amended, Public Law 78-534.

:050 OBJECTIVES: To provide loan assistance to sponsoring local organizations in authorized **watershed** (WS) areas for share of cost for works of improvement.

:060 TYPES OF ASSISTANCE: Direct Loans.

:070 USES AND USE RESTRICTIONS: Loan funds may be used to help local sponsors provide the local share of the cost of **watershed** works of improvement for flood prevention, irrigation, drainage, water quality management, sedimentation control, fish and wildlife development, public water based recreation, and water storage and related costs. The total amount of WS loans outstanding in any one **watershed** cannot exceed \$10,000,000.

:080 ELIGIBILITY REQUIREMENTS:

:081 Applicant Eligibility: To be eligible for a WS loan an applicant must: (1) Be a sponsoring local organization, such as municipal corporation, soil and water conservation district, or other organization not operated for profit in the approved **watershed** project; and (2) have authority under State law to obtain, give security for, and raise revenues to repay the loan and to operate and maintain the facilities to be financed with the loan.

:082 Beneficiary Eligibility: Farmers, ranchers, rural residents and other residents in the authorized **watershed** area.

:083 Credentials/Documentation: Evidence of legal capacity, economic feasibility and financial responsibility relative to the activity for which assistance is requested. This program is excluded from coverage under OMB Circular No. A-87.

:090 APPLICATION AND AWARD PROCESS:

:091 Preapplication Coordination: The standard application forms furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. An environmental assessment is required for this program. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.

:092 Application Procedure: Preapplication Form SF-424 is filed at county or District RD office from which assistance may be obtained.

:093 Award Procedure: After the preapplication has been reviewed by the District Office, it is forwarded to the RD State Office for review and processing instructions. Following review by the State Office, the applicant is notified about eligibility, availability of funds, and if an application should be filed. Upon favorable review and approval of a complete application package, funds are made available to the RD District Office for delivery.

:094 Deadlines: None.

:095 Range of Approval/Disapproval Time: From 30 to 90 days.

:096 Appeals: If an application is rejected, the reasons for rejection are fully stated. The applicant may request a review of the decision from the next higher management level of RD.

:097 Renewals: Not applicable.

:100 ASSISTANCE CONSIDERATIONS:

:101 Formula and Matching Requirements: This program has no statutory formula.

:102 Length and Time Phasing of Assistance: A time limitation is not specified for the use of RUS loan funds. Funds will be awarded when all RD requirements are met and the project can be completed on a timely basis. Funds may be advanced on an as needed basis by RD.

:110 POST ASSISTANCE REQUIREMENTS:

:111 Reports: Periodic progress reports are made to the RUS.

:112 Audits: Periodic audits should be made as part of the recipient's systems of financial management and internal control to meet terms and conditions of loans and other agreements. In accordance with the provisions of OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations," State and local governments that expend financial assistance of \$300,000 or more within the State's fiscal year shall have an audit made for that year. State and local governments that expend less than \$300,000 within the State's fiscal year shall have an audit made in accordance with Circular No. A-133, or in accordance with Federal laws and regulations governing the programs in which they participate.

:113 Records: Records and accounts are required to reflect the operations of the project.

:120 FINANCIAL INFORMATION:

:121 Account Identification: 12-4140-0-3-351; 12-1140-0-1-351.

:122 Obligations: (Loans) FY 96 \$0; FY 97 est \$0; and FY 98 \$0. (operating using prior year funds.)

:123 Range and Average of Financial Assistance: Not applicable.

:130 PROGRAM ACCOMPLISHMENTS: None.

:140 REGULATIONS, GUIDELINES, AND LITERATURE: **Watershed** Loans - Rural Utilities Service - PA-406 - no charge. Rural Utilities Service PA-973 - no charge. 7 CFR 1942 Subpart I.

:150 INFORMATION CONTACTS:

:151 Regional or Local Office: Consult your local telephone directory for RD County or District Office number. If no listing, contact appropriate RD State office listed in Appendix IV of the Catalog.

:152 Headquarters Office: Assistant Administrator, Water and Waste Rural Utilities Service, Department of Agriculture, Washington, DC 20250. Telephone: (202) 690-2670. Use the same number for FTS.

:160 RELATED PROGRAMS: 10.766, Community Facilities Loans; 10.902,

Soil and Water Conservation; 10.765, **Watershed** Protection and Flood Prevention; 10.906, **Watershed** Surveys and Planning.

:170 EXAMPLES OF FUNDED PROJECTS: Loans were made to: 1) Install or improve facilities to store and convey irrigation water to farms; treat and distribute water for farm use, and drain farm areas; 2) install structures and equipment for flood prevention; 3) install or improve a municipal water supply reservoir with recreation, fish and wild life improvement; 4) establish recreational developments in or adjacent to reservoirs, lakes, streams, or shorelines; and 5) provide fish and wildlife developments.

:180 CRITERIA FOR SELECTING PROPOSALS: Not applicable.

:010 66.435 Water Pollution Control\_Lake Restoration Cooperative Agreements

:020 (Clean Lakes Program)

:030 FEDERAL AGENCY: Office of Water, Environmental Protection Agency

:040 AUTHORIZATION: Clean Water Act, Section 314, as amended, Public Law 95-217, 33 U.S.C. 1251 et seq.

:050 OBJECTIVES: To provide financial assistance to States and certain Indian Tribes for assessing the water quality of publicly owned lakes; diagnosing the causes of degradation in publicly owned lakes; developing lake restoration and protection plans; implementing these plans to restore and preserve the lake; and post restoration monitoring to determine the longevity and effectiveness of restoration. No new funds have been provided by Congress since 1995. Existing projects are being completed with previously awarded funds.

:060 TYPES OF ASSISTANCE: Project Grants.

:070 USES AND USE RESTRICTIONS: Available for allowable direct cost expenditures incident to project performance plus allocable portions of allowable indirect costs of the applicant, in accordance with established EPA policies.

:080 ELIGIBILITY REQUIREMENTS:

:081 Applicant Eligibility: By statute, State agencies and certain Indian Tribes (as designated by Section 518(e) of the Water Quality Act of 1987). However, through written interagency agreements, funds may be passed through to city and county governments or other locally and municipally constituted authorities. This program is available to each State, Indian Tribe (designated by Section 518(e)). Territory and possession of the U.S., including the District of Columbia. After April 1, 1988, a State/Tribe must submit bi-annually an approved Lake Water Quality Assessment to be eligible for assistance under the program.

:082 Beneficiary Eligibility: The perspective public interests served by the applicant authority.

:083 Credentials/Documentation: Cost will be determined in accordance with OMB Circular No. A-87 for State and local governments.

:090 APPLICATION AND AWARD PROCESS:

:091 Preapplication Coordination: Discussion with program and regional offices is essential. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review. Reference to the EPA Clean Lakes Program guidance is highly recommended.

:092 Application Procedure: Application forms and completed applications should be requested from and submitted to the appropriate EPA Regional Office (see Appendix IV of the Catalog). The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. An environmental impact assessment is required for this program. This program is excluded from coverage under OMB Circular No. A-110.

:093 Award Procedure: Each application shall be subjected to

administrative evaluation to determine the adequacy of the application in relation to grant regulations and to program evaluation; technical and extramural reviews determine the merit and relevance of the project.

:094 Deadlines: Determined annually. Contact appropriate EPA Regional Office. (See Appendix IV of the Catalog.)

:095 Range of Approval/Disapproval Time: Approximately 90 days.

:096 Appeals: There is no appeals procedure; however, revised proposals may be submitted. A standard grant application should be prepared and submitted which will be reviewed in the same manner as a new application and will compete for available funds. Appeals are subject to the provisions in 40 CFR Part 31 Subpart F.

:097 Renewals: None; however, consideration is given to continuing, lengthy and involved projects on a phased basis. The applicant is provided opportunity to apply for subsequent phases.

#### :100 ASSISTANCE CONSIDERATIONS:

:101 Formula and Matching Requirements: A minimum of 30 percent cost sharing is administratively required for lake diagnostic-feasibility studies (Phase I), with a maximum of \$100,000. A minimum of 50 percent cost sharing is administratively required for implementation projects (Phase II). A minimum of 50 percent cost sharing is administratively required for Lake Water Quality Assessments (30 percent in hardship cases), with a maximum of \$100,000 per study for two years. For post-restoration monitoring (Phase III), funding assistance up to \$125,000 may be available and will require at least a 30 percent nonfederal match.

:102 Length and Time Phasing of Assistance: Approved project period may not exceed three years for Phase I, four years for Phase II, five years for Phase III and five years for Lake Water Quality Assessments.

#### :110 POST ASSISTANCE REQUIREMENTS:

:111 Reports: Quarterly interims and final progress, expenditure, equipment and invention reports.

:112 Audits: In accordance with the provisions of OMB Circular No. A-133, "Audits of States, Local Governments and Non-Profit Organizations," nonfederal entities that receive financial assistance of \$300,000 or more within the State's fiscal year shall have an audit made for that year. The Office of Management and Budget (OMB) Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations," was published in the Federal Register on June 30, 1997. The Circular implements the single audit Act amendments of 1996. The Circular requires nonfederal entities that expend more than \$300,000 in Federal award dollars, to have an audit conducted in accordance with the Circular's provisions. With the revised Circular, the previous OMB Circular No. A-128 for single audits of State and local governments was rescinded and the single audit requirements for these entities were incorporated among the provisions of OMB Circular No. A-133.

:113 Records: Financial records, including all documents to support entries on accounting records and to substantiate charges to each grant, must be maintained for three years from the date of submission of the annual financial status report. If questions still remain, such as those raised as a result of audit, related records should be retained until the matter is completely resolved.

#### :120 FINANCIAL INFORMATION:

:121 Account Identification: 68-7801-0-8-304.

:122 Obligations: (Grants) FY 96 \$0; FY 97 est \$0; and FY 98 est \$0.

:123 Range and Average of Financial Assistance: Diagnostic-Feasibility Study (Phase I) grants: \$10,500 to \$100,000; \$63,210. Implementation Project (Phase II) grants: \$51,403 to \$265,400; \$145,723. LWQA: \$1,000 to \$100,000; over \$53,700. Phase III: \$65,674 to \$125,000; over \$106,200.

:130 PROGRAM ACCOMPLISHMENTS: Funded Phase I projects assist the recipient in determining a lake's current condition and developing possible methods for lake restoration and protection. Funded Phase II projects implement the most feasible restoration/protection alternatives for a particular lake and its **watershed**. Such activities include **watershed** pollution controls, best management practices, diversion and flushing of sediment and nutrients, shoreline stabilization, phosphorus precipitation and inactivation, hypolimnetic withdrawal, hypolimnetic aeration, sediment oxidation, sediment removal, and lake drawdown. Phase III studies are to determine the longevity and effectiveness of various restoration techniques, thereby advancing the science of lake restoration. Through fiscal year 1995, 49 States and 18 Indian Tribes have received Clean Lakes grants totaling approximately \$145 million in Federal funds. Since the program was initially funded in 1976, State and Tribal grants have included 348 Phase I, 251 Phase II, 14 Phase III and 113 Lake Water Quality Assessment grants.

:140 REGULATIONS, GUIDELINES, AND LITERATURE: General Grant Regulations and Procedures, Environmental Protection Agency (40 CFR Part 31); Final Regulations: Cooperative Agreements for Protecting and restoring Publicly Owned Lakes (40 CFR Part 35.1600); Final rules were published in the Federal Register February 5, 1980 concerning implementation of a State and local assistance program grant for restoring publicly owned lakes, as authorized by Section 314 of the Clean Water Act; "Federal Assistance Programs of the Environmental Protection Agency"; and EPA Clean Lakes Program Guidance Manual available from the appropriate EPA Regional Office (see Appendix IV of the Catalog).

:150 INFORMATION CONTACTS:

:151 Regional or Local Office: Individuals are encouraged to communicate with the appropriate EPA Regional Office listed in Appendix IV of the Catalog.

:152 Headquarters Office: For information concerning grant application procedures, contact Environmental Protection Agency, Grants Administration Division, (3903F), Washington, DC 20460. For program information, contact Anne Weinberg (4503F), Assessment and **Watershed** Protection Division, Office of Wetlands, Oceans and Watersheds, Environmental Protection Agency, Washington, DC 20460. Telephone: (202) 260-7107.

:160 RELATED PROGRAMS: 66.419, Water Pollution Control State and Interstate Program Support; 66.454, Water Quality Management Planning; 66.500, Environmental Protection Consolidated Research.

:170 EXAMPLES OF FUNDED PROJECTS: See PROGRAM ACCOMPLISHMENTS.

:180 CRITERIA FOR SELECTING PROPOSALS: A Clean Lakes project must involve a lake that is publicly owned. Evaluation of project proposals includes considerations of: (1) technical feasibility, (2) public

benefits, (3) adverse environmental impacts, (4) improvement in fish and wildlife habitat, (5) degree project considers "open space" policies, (6) reasonableness of proposed cost relative to proposed work, (7) State priority ranking, and (8) proposed operation and maintenance program.



:010 66.454 Water Quality Management Planning

:020 (205(j)(2)

:030 FEDERAL AGENCY: OFFICE OF WATER, ENVIRONMENTAL PROTECTION AGENCY

:040 AUTHORIZATION: Clean Water Act, Sections 205(j) and 604(b), as amended, Public Law 97-117; Water Quality Act of 1987, Public Law 100-4.

:050 OBJECTIVES: To assist States (including territories and the District of Columbia), Regional Public Comprehensive Planning Organizations (RPCPOs) and Interstate Organizations (IOs) in carrying out water quality management (WQM) planning.

:060 TYPES OF ASSISTANCE: Formula Grants.

:070 USES AND USE RESTRICTIONS: Section 604(b) funds are awarded under Section 205(j)(2), to State water quality management agencies to carry out water quality management planning. Pursuant to Section 205(j)(3) of the CWA, as amended, States are required to allocate at least 40 percent of funds awarded under 205(j)(2) to eligible Regional Public Comprehensive Planning Agencies (RPCPOs) and Interstate Organizations (IOs). EPA may approve a State's request to pass through less than 40 percent if, after consultation with its RPCPOs and IOs, the Governor determines that pass through of at least 40 percent will not: (1) result in significant participation by RPCPOs and IOs in WQM planning; and (2) significantly assist in development and implementation of the State's WQM plan.

:080 ELIGIBILITY REQUIREMENTS:

:081 Applicant Eligibility: State Water Quality Management Agencies.

:082 Beneficiary Eligibility: State Water Quality Management Agencies.

:083 Credentials/Documentation: Compliance with 40 CFR 31. Costs will be determined in accordance with OMB Circular No. A-87 for State and local governments.

:090 APPLICATION AND AWARD PROCESS:

:091 Preapplication Coordination: Preapplication coordination with appropriate Regional Office is recommended. The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.

:092 Application Procedure: The grant application must be submitted to the appropriate EPA Regional Administrator's Office. This program is excluded from coverage under OMB Circular No. A-110.

:093 Award Procedure: Grant application is reviewed by appropriate EPA Regional Office.

:094 Deadlines: Grant application forms must be submitted according to dates established by the Regional Administrators. Consult the appropriate EPA Regional Office for details.

:095 Range of Approval/Disapproval Time: Approximately 45 days.

:096 Appeals: As described in 40 CFR Part 31, Subpart F.

:097 Renewals: Not applicable.

:100 ASSISTANCE CONSIDERATIONS:

:101 Formula and Matching Requirements: Each fiscal year, the Administrator shall reserve under Section 604(b) an amount not to exceed one percent of the amount allotted and available for obligation for construction grants or \$100,000, whichever is greater, for the purposes of making grants to the States to carry out water quality management planning. Under Section 205(j)(3), at least 40 percent of a State's annual award under 205(j)(2), must be allocated to eligible RPCPOs and IOs, unless EPA approves a lesser amount.

:102 Length and Time Phasing of Assistance: As determined in accordance with Section 205(j) of Public Law 97-117.

:110 POST ASSISTANCE REQUIREMENTS:

:111 Reports: Annual expenditure reports.

:112 Audits: In accordance with the provisions of OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations," nonfederal entities that receive financial assistance of \$300,000 or more within the State's fiscal year shall have an audit made for that year. The Office of Management and Budget (OMB) Circular No. A-133, "Audits of State, Local Governments, and Non-Profit Organizations," was published in the Federal Register on June 30, 1997. The Circular implements the Single Audit Act amendments of 1996. The Circular requires nonfederal entities that expend more than \$300,000 in Federal award dollars, to have an audit conducted in accordance with the Circular's provisions. With the revised Circular, the previous OMB Circular No. A-128 for single audits of State and local governments was rescinded and the single audit requirements for these entities were incorporated among the provisions of OMB Circular No. A-133.

:113 Records: Financial records, including all documents to support entries on accounting records and to substantiate charges to each grant, must be kept available to personnel authorized to examine EPA grant accounts. All records kept for three years from date of submission of the annual financial status report. If questions remain, records retained until matter is completely resolved.

:120 FINANCIAL INFORMATION:

:121 Account Identification: 68-0103-0-1-304.

:122 Obligations: (Grants) FY 96 \$20,573,000; FY 97 est \$13,400,000; and FY 98 est \$11,905,000.

:123 Range and Average of Financial Assistance: \$100,000 to \$2,500,000; \$250,000.

:130 PROGRAM ACCOMPLISHMENTS: In fiscal year 1996, 57 State and territorial grants were awarded to support planning activities.

:140 REGULATIONS, GUIDELINES, AND LITERATURE: EPA General Grant Regulations and Procedures, 40 CFR Part 31; EPA Assistance Administration Manual.

:150 INFORMATION CONTACTS:

:151 Regional or Local Office: Contact appropriate EPA Regional Office listed in Appendix IV of the Catalog.

:152 Headquarters Office: Don Kunkoski, Assessment and **Watershed** Protection Division (4503F), Office of Water, EPA 401 M Street, SW., Washington, DC 20460. Telephone: (301) 694-7329.

:160 RELATED PROGRAMS: 66.419, Water Pollution Control\_State and Interstate Program Support.

:170 EXAMPLES OF FUNDED PROJECTS: Grants to States for revising water quality standards; performing wasteload allocations/total maximum daily loads, point and nonpoint source planning activities.

:180 CRITERIA FOR SELECTING PROPOSALS: Funds are awarded to State agencies in accordance with Section 205(j) of the Clean Water Act and annual EPA program guidance.

:010 66.461 Wetlands Protection\_Development Grants

:030 FEDERAL AGENCY: OFFICE OF WATER, ENVIRONMENTAL PROTECTION AGENCY

:040 AUTHORIZATION: Clean Water Act, Public Law 92-500, as amended, Section 104(b)(3), 33 U.S.C. 1254(b)(3).

:050 OBJECTIVES: To assist States, Indian tribes and local governments in developing new or enhancing existing wetlands protection programs.

:060 TYPES OF ASSISTANCE: Project Grants.

:070 USES AND USE RESTRICTIONS: These grants are intended to encourage wetlands protection program development or to enhance/augment existing effective programs. The projects that will be funded under this program should support the initial development of a wetlands protection program or support enhancement/refinement of a existing program. It is anticipated that funding will fall into two broad categories of projects: (1) encouragement of developing new programs or (2) augmentation of ongoing, effective wetlands programs. Grant funds cannot be used for operational support of wetlands protection programs. Projects must clearly demonstrate a direct link to increasing a State's, tribe's, or local government's ability to protect its wetlands resources.

:080 ELIGIBILITY REQUIREMENTS:

:081 Applicant Eligibility: State or tribal agencies; interstate/inter-tribal entities and associations; and local governmental entities are eligible to receive funding.

:082 Beneficiary Eligibility: State and Tribal agencies and local governments involved in administering wetlands protection programs or programs related to or complementary with wetlands protection programs.

:083 Credentials/Documentation: Costs will be determined in accordance with OMB Circular No. A-87 for State and local governments.

:090 APPLICATION AND AWARD PROCESS:

:091 Preapplication Coordination: Preapplication coordination with appropriate regional office is encouraged. The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.

:092 Application Procedure: Application forms and completed applications should be requested from and submitted to the appropriate EPA Regional Office identified in Appendix IV of the Catalog.

:093 Award Procedure: Grant applications are reviewed by the appropriate Regional Office and, if approved, grant is awarded by the Regional Administrator.

:094 Deadlines: Determined annually. Contact appropriate EPA Regional Office.

:095 Range of Approval/Disapproval Time: Grants are usually approved within 4 months of receipt of complete application.

:096 Appeals: As described in 40 CFR Part 31, Subpart F.

:097 Renewals: None.

:100 ASSISTANCE CONSIDERATIONS:

:101 Formula and Matching Requirements: Total grant project is the Federal share and the required minimum State, tribal or local match. In this case, the required minimum match is 25 percent of the total project costs. This does not preclude the State, tribe, or local government from putting additional funds into the project.

:102 Length and Time Phasing of Assistance: The terms of the grant shall be determined at time of grant award.

:110 POST ASSISTANCE REQUIREMENTS:

:111 Reports: Quarterly interim and final progress and expenditure reports; program evaluations and other reports as required by the specific terms of the Agreement.

:112 Audits: Grants are subject to inspections and audit by representatives of the Comptroller General of the United States and EPA or any authorized representative. Periodic audits should be made as part of the recipient's systems of financial management and internal control to meet terms and conditions of grants and other agreements. In accordance with the provisions of OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organization, nonfederal entities that receive financial assistance of \$300,000 or more within the State's fiscal year shall have an audit made for that year. The Office of Management and Budget (OMB) Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations," was published in the Federal Register on June 30, 1997. The Circular implements the Single Audit Act amendments of 1996. The Circular requires nonfederal entities that expend more than \$300,00 in Federal award dollars, to have an audit conducted in accordance with the Circular's provisions. With the revised Circular, the previous OMB Circular No. A-128 for single audits of State and local governments was rescinded and the single audit requirements for these entities were incorporated among the provisions of OMB Circular No. A-133.

:113 Records: Financial records, including all documents to support entries on accounting records and to substantiate changes to each grant must be kept available to personnel authorized to examine EPA grant accounts. All records must be maintained until expiration of three years from the date of submission of the final expenditure report. If questions still remain, such as those raised as a result of audit, related records should be retained until the matter is completely resolved.

:120 FINANCIAL INFORMATION:

:121 Account Identification: 68-0108-0-1-304.

:122 Obligations: (Grants) FY 96 \$15,000,000; FY 97 est \$15,000,000; and FY 98 est \$15,000,000.

:123 Range and Average of Financial Assistance: In fiscal year 1996, grant awards ranged from \$1,500 to \$489,000.

:130 PROGRAM ACCOMPLISHMENTS: Funding priority focused on Wetland/Watershed Protection Approach Demonstration Projects and River Corridor and Wetland Restoration Projects. Other projects related to development or improvement of Wetland programs are also eligible.

:140 REGULATIONS, GUIDELINES, AND LITERATURE: General Grant Regulations, and Procedures (40 CFR Part 31 and 35).

:150 INFORMATION CONTACTS:

:151 Regional or Local Office: Cathy Manwaring, EPA, Region I, Boston, MA 02203. Telephone: (617) 565-3227. Dan Montella, Wetlands Protection Section, EPA, Region II, New York, NY 10278. Telephone: (212) 637-3801. Barbara D'Angelo, Environmental Services Division, EPA, Region III, Philadelphia, PA 19107. Telephone: (215) 566-2714. Peter Kalla, Wetlands Protection Section, EPA, Region IV, Atlanta, GA 30365. Telephone: (404) 562-9414. Sue Elston, EPA, Region V, Chicago, IL 60604. Telephone: (312) 886-6115. Pamela Mintz, EPA, Region VI, Dallas, TX 75202. Telephone: (214) 655-8334. Ann Jacobs, Water Resources Protection Branch, EPA, Region VII, Kansas City, KS 66101. Telephone: (913) 551-7930. Dave Rathke, EPA, Region VIII, Denver, CO 80202. Telephone: (303) 312-6223. Suzanne Marr, Water Management Division, EPA, Region IX, San Francisco, CA 94105. Telephone: (415) 974-1974. Steve Roy, Aquatic Resources Unit, EPA, Region X, Seattle, WA 98101. Telephone: (206) 553-6221.

:152 Headquarters Office: Lori Williams, Wetlands Division, Office of Wetlands, Oceans and Watersheds (4502F), EPA, 401 M Street, SW., Washington, DC 20460. Telephone: (202) 260-5084.

:160 RELATED PROGRAMS: 66.419, Water Pollution Control State and Interstate Program Support; 66.454, Water Quality Management Planning; 66.456, National Estuary Program; 66.458, Capitalization Grants for State Revolving Funds.

:170 EXAMPLES OF FUNDED PROJECTS: None.

:180 CRITERIA FOR SELECTING PROPOSALS: Each application will be reviewed by EPA according to the following criteria: (1) clarity of proposal work plan; (2) success of previous projects; (3) likelihood of success; (4) transferability to other States tribes or local governments; (5) potential environmental results; and (6) investment/commitment of States, tribes or local government.

:010 15.617 Wildlife Conservation and Appreciation

:020 (Partnerships For Wildlife)

:030 FEDERAL AGENCY: U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

:040 AUTHORIZATION: Partnerships For Wildlife Act, Title VII, Section 7105(g), Public Law 102-587; 106 Stat. 5098; 16 U.S.C. 3741.

:050 OBJECTIVES: To establish a partnership among the United States Fish and Wildlife Service, designated State Agencies, and private organizations and individuals to (1) carry out wildlife conservation and appreciation projects to conserve the entire array of diverse fish and wildlife species in the United States and to provide opportunities for the public to use and enjoy these fish and wildlife species through nonconsumptive activities; (2) enable designated State agencies to respond more fully and utilize their statutory and administrative authorities by carrying out wildlife conservation and appreciation projects; and (3) encourage private donations, under leadership of the National Fish and Wildlife Foundation, to carry out wildlife conservation and appreciation projects.

:060 TYPES OF ASSISTANCE: Project Grants.

:070 USES AND USE RESTRICTIONS: Eligible projects include inventory of fish and wildlife species; determination and monitoring of the size, range, and distribution of populations of fish and wildlife species; identification of the extent, condition, and location of the significant habitats of fish and wildlife species; identification of the significant problems that may adversely affect fish and wildlife species and their significant habitats; actions to conserve fish and wildlife species and their habitats; and actions of which the principal purpose is to provide opportunities for the public to use and enjoy fish and wildlife through nonconsumptive activities.

:080 ELIGIBILITY REQUIREMENTS:

:081 Applicant Eligibility: Any designated fish and wildlife agency of the fifty States, the District of Columbia and the insular areas. A designated agency includes any department or division of any department of another name, of a State that is empowered under its laws to exercise the functions normally exercised by a State fish and wildlife agency.

:082 Beneficiary Eligibility: This program is to benefit any wild members of the animal kingdom that are in an unconfined state, except animals that are: (1) taken for recreation, fur, or food; (2) Federally listed as endangered or threatened species under the Endangered Species Act; or (3) marine mammals defined by the Marine Mammal Protection Act. This program is intended to provide recreation to broad segments of the public who enjoy nonconsumptive wildlife recreation.

:083 Credentials/Documentation: Costs will be determined in accordance with 43 CFR Part 12, Subpart C, "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments." Section 12.62 identifies Federal cost principles for determining allowable costs.

:090 APPLICATION AND AWARD PROCESS:

:091 Preapplication Coordination: This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying

for assistance, if the State has selected the program for review.

:092 Application Procedure: Participating States will submit a narrative statement describing the need, objectives, benefits, approach, and estimated cost for the proposed project along with the standard application forms furnished by the Federal agency and required by 43 CFR Part 12, Subpart C, "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments."

:093 Award Procedure: The Director of the Fish and Wildlife Service will select projects to be funded based on established criteria.

:094 Deadlines: Each State must submit proposals not later than September 1 for funding the next fiscal year.

:095 Range of Approval/Disapproval Time: Approximately 180 days.

:096 Appeals: Final determination rests with the Director of the Fish and Wildlife Service.

:097 Renewals: Funding of projects selected for future years is contingent on the future availability of funds.

:100 ASSISTANCE CONSIDERATIONS:

:101 Formula and Matching Requirements: The Federal share of project costs is not to exceed one third of the project cost, except that if two or more States cooperatively fund a project the Federal share may be 40 percent. Private funding must be available to match the Federal share.

:102 Length and Time Phasing of Assistance: Projects normally funded through annual segments.

:110 POST ASSISTANCE REQUIREMENTS:

:111 Reports: A Performance Report is required for each annual segment within 90 days after the end of the segment.

:112 Audits: For awards made under this Program, grantees and subgrantees are responsible for obtaining audits in accordance with the Single Audit Act Amendments of 1996 (31 U.S.C. 7501 et seq.), and OMB Circular A-133.

:113 Records: Cost records must be maintained separately for each project. Records, accounts and supporting documents must be retained for three years after submission of final request for reimbursement.

:120 FINANCIAL INFORMATION:

:121 Account Identification: 14-5150-0-2-303.

:122 Obligations: (Grants) FY 97 \$1,195,206; FY 98 est \$1,047,000; and FY 99 est \$910,000.

:123 Range and Average of Financial Assistance: \$3,333 to \$76,000; \$22,099.

:130 PROGRAM ACCOMPLISHMENTS: In fiscal year 1997, funds were used to carry out 16 research and survey projects, 6 educational and recreational projects and 13 management projects.

:140 REGULATIONS, GUIDELINES, AND LITERATURE: U. S. Fish and Wildlife Service Federal Aid Handbook. Available free to designated fish and wildlife agencies.



:150 INFORMATION CONTACTS:

:151 Regional or Local Office: See Catalog Appendix IV for addresses.

:152 Headquarters Office: Fish and Wildlife Service, Department of the Interior, Washington, DC 20240. Contact: Chief, Division of Federal Aid. Telephone: (703) 358-2156.

:160 RELATED PROGRAMS: 15.605, Sport Fish Restoration; 15.611, Wildlife Restoration; 15.614, Coastal **Wetlands** Planning, Protection and Restoration; 15.618, Administrative Grants for Federal Aid in Sport Fish and Wildlife Restoration.

:170 EXAMPLES OF FUNDED PROJECTS: Projects to determine status of nongame animals, to manage nongame wildlife populations, to inform the public about nongame animals, and to allow the public recreational opportunities pertaining to nongame wildlife enjoyment.

:180 CRITERIA FOR SELECTING PROPOSALS: Project must be submitted by the State agency having responsibility for fish and wildlife program in the State. Purpose of the project must be consistent with the purpose and conditions of the Act. A review panel established by the Director of the Fish and Wildlife Service will review all projects and make funding recommendations to the Director.

## A horizontal bar with a grayscale gradient, transitioning from light gray on the left to dark gray on the right. It features several thin, parallel horizontal lines across its width.

# Rapid Bioassessment Protocol II

## Biosurvey Field Data Sheet

Sleepy Hollow Ditch  
Cedar Lake  
8/7/98

Site 1 - upstream  
reference site

upstream from RR bridge

### RELATIVE ABUNDANCE OF AQUATIC BIOTA

Periphyton ① 1 2 3 4  
Filamentous Algae ① 1 2 3 4  
Macrophytes ① 1 2 3 4

Slimes ① 1 2 3 4  
Macroinvertebrates 0 1 ② 3 4  
Fish ① 1 2 3 4

0 = Absent/Not Observed

1 = Rare

2 = Common

3 = Abundant

4 = Dominant

### MACROBENTHOS QUALITATIVE SAMPLE LIST

List Families Present/Indicate Abundance

Oligochaeta - 5		
	Anisoptera - 1	
Gastropoda - 20 - physa		Coleoptera
	Zygoptera	
Bivalvia		Diptera 5 - Culicidae (larvae)
	Plecoptera	20 - Chironomidae (Blood Red = 8)
Ephemeroptera		
Isopoda - 3	Trichoptera - 1	
Annulida - 15 (larvae)		
Hydracarina - 1 (water bug)		
Other Pelecypoda - 40 (mussel)		

### RIFFLE SAMPLE

#### FUNCTIONAL FEEDING GROUPS

(Indicate No. of Individuals Representing Group)

Scrapers 20 Filtering Collectors 41

#### CPOM SAMPLE FUNCTIONAL FEEDING GROUPS (Indicate No. of Individuals Representing Group)

Shredders 1 Total Org. in Sample 24

#### Observations

Bullfrogs  
2 - smaller frogs  
Water striders  
Water boatmen - Corixidae  
Crayfish

Figure 6.2-1. Biosurvey Field Data Sheet for use with Rapid Bioassessment Protocol II.

# Rapid Bioassessment Protocol II

## Biosurvey Field Data Sheet

8/7/98  
Site 2A  
at Rail Road Bridge

### RELATIVE ABUNDANCE OF AQUATIC BIOTA

Periphyton 0 ① 2 3 4  
Filamentous Algae ① 1 2 3 4  
Macrophytes ① 1 2 3 4

Slimes ① 1 2 3 4  
Macroinvertebrates 0 1 ② 3 4  
Fish 0 ① 2 3 4

↳ Shad under bridge  
4 = Dominant

0 = Absent/Not Observed

1 = Rare

2 = Common

3 = Abundant

### MACROBENTHOS QUALITATIVE SAMPLE LIST

List Families Present/Indicate Abundance

Oligochaeta - 5		
	Anisoptera	
Gastropoda - 15 - physa		Coleoptera
	Zygoptera	(Blood red - 3)
Bivalvia		Diptera 5 - Chironomidae
	Plecoptera	15 - Culicidae
Ephemeroptera		
	Trichoptera	
Annelida - 20		
Other Isopoda - 80		

### RIFFLE SAMPLE

#### FUNCTIONAL FEEDING GROUPS

(Indicate No. of Individuals Representing Group)

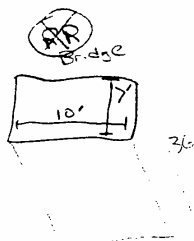
Scrapers 15 Filtering Collectors 0

#### CPOM SAMPLE FUNCTIONAL FEEDING GROUPS (Indicate No. of Individuals Representing Group)

Shredders Total Org. in Sample

Observations water striders  
4 Dead Shad  
- small school (18) of Shad

Figure 6.2-1. Biosurvey Field Data Sheet for use with Rapid Bioassessment Protocol II.



## Rapid Bioassessment Protocol II

### Biosurvey Field Data Sheet

Sleepy Hollow Ditch

2/7/98  
Site 2 - below  
train tracks - in  
prop. wetland area.

#### RELATIVE ABUNDANCE OF AQUATIC BIOTA

Periphyton	0	①	2	3	4
Filamentous Algae	①	1	2	3	4
Macrophytes	①	1	2	3	4

Slimes	①	1	2	3	4
Macroinvertebrates	0	1	②	3	4
Fish	①	1	2	3	4

0 = Absent/Not Observed

1 = Rare

2 = Common

3 = Abundant

4 = Dominant

#### MACROBENTHOS QUALITATIVE SAMPLE LIST

List Families Present/Indicate Abundance

Oligochaeta - 15		
	Anisoptera	
Gastropoda - 25 - physa		Coleoptera - 10
	Zygoptera	(Blood red - 10)
Bivalvia		Diptera 20 - Chironomidae
	Plecoptera	25 - Culicidae (Mosquitoes)
Ephemeroptera		
	Trichoptera	
Annelida - 15 (leech)		

Other Isopoda - 20

#### RIFFLE SAMPLE

#### FUNCTIONAL FEEDING GROUPS

(Indicate No. of Individuals Representing Group)

Scrapers	25	Filtering Collectors	0
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#### CPOM SAMPLE FUNCTIONAL FEEDING GROUPS (Indicate No. of Individuals Representing Group)

Shredders	30	Total Org. in Sample	40
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Observations water striders  
Frogs -

Figure 6.2-1. Biosurvey Field Data Sheet for use with Rapid Bioassessment Protocol II.

# Rapid Bioassessment Protocol II

## Biosurvey Field Data Sheet

4/6/98  
Sleepy Hollow Ditch

Site 3

15:00 - 17:00

### RELATIVE ABUNDANCE OF AQUATIC BIOTA

Periphyton	0	①	2	3	4
Filamentous Algae	①	1	2	3	4
Macrophytes	①	1	2	3	4

Slimes	①	1	2	3	4
Macroinvertebrates	0	①	2	3	4
Fish	0	①	2	3	4

↳ 2 carp

0 = Absent/Not Observed

1 = Rare

2 = Common

3 = Abundant

4 = Dominant

### MACROBENTHOS QUALITATIVE SAMPLE LIST

List Families Present/Indicate Abundance

Oligochaeta	5		
		Anisoptera	
Gastropoda	3 - physa		Coleoptera
		Zygoptera	
Bivalvia			(Blood red - 18)
		Plecoptera	Diptera - 28 chironomidae
			1 larva tipulidae
Ephemeroptera			
Annelida - 40 (heath)		Trichoptera	
Isopoda - 30			
Other	Decapoda - 1		

### RIFFLE SAMPLE

#### FUNCTIONAL FEEDING GROUPS

(Indicate No. of Individuals Representing Group)

Scrapers	3	Filtering Collectors	1
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#### CPOM SAMPLE FUNCTIONAL FEEDING GROUPS (Indicate No. of Individuals Representing Group)

Shredders	12	Total Org. in Sample	28
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#### Observations

water striders  
frogs - (3 sizes, including bull frog)  
small sand trichoptera housing present under rocks  
- no living residents

Figure 6.2-1. Biosurvey Field Data Sheet for use with Rapid Bioassessment Protocol II.

# Rapid Bioassessment Protocol II

## Biosurvey Field Data Sheet

5/6/98  
site 41  
closest to Lake  
Lawman Road  
near 145 Place  
10:00 - 12:00  
Sleepy Hollow Ditch

### RELATIVE ABUNDANCE OF AQUATIC BIOTA

Periphyton	0	①	2	3	4
Filamentous Algae	0	①	2	3	4
Macrophytes	①	1	2	3	4

Slimes	①	1	2	3	4
Macroinvertebrates	0	①	2	3	4
Fish	<del>0</del>	1	②	3	4

↳ Shad - many schools  
Carp - 2  
Small Minnows

0 = Absent/Not Observed

1 = Rare

2 = Common

3 = Abundant

4 = Dominant

### MACROBENTHOS QUALITATIVE SAMPLE LIST

List Families Present/Indicate Abundance

Oligochaeta - 30		
	Anisoptera	
Gastropoda - 18 - Physa		Coleoptera - 1
2 - Gyraulus		
	Zygoptera	(Blair Red - 25)
Bivalvia		Diptera - 37 - Chironomidae
	Plecoptera	1 - tipulidae
Ephemeroptera		
1 - Crayfish	Trichoptera	
3 - Isopoda		
Other 10 - annelida		

### RIFFLE SAMPLE

#### FUNCTIONAL FEEDING GROUPS

(Indicate No. of Individuals Representing Group)

Scrapers 20	Filtering Collectors 0
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### CPOM SAMPLE FUNCTIONAL FEEDING GROUPS (Indicate No. of Individuals Representing Group)

Shredders 2	Total Org. in Sample 25
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### Observations

shredders  
scrapers  
collectors  
predators

water striders  
bull frog  
crayfish

Figure 6.2-1. Biosurvey Field Data Sheet for use with Rapid Bioassessment Protocol II.

# DATA SUMMARY SHEET

Station No.	St 1	St 2A	St 2	St 3	St 4			
Station Location	SHD	SHD	SHD	SHD	SHD			
Taxa Richness	14	8	9	9	11			
H/FBI (modified)	6.80	7.96	7.69	7.60	7.15			
Functional Feeding Groups								
Rifle Community								
Scrapers/Filt. Collect.	20/41	15/0	25/0	3/1	20/0			
CPOM Community								
Shredders/Total	18/122	95/141	45/131	31/109	4/104			
EPT/Chironomidae	1/20	0/5	0/20	0/28	0/37			
% Contribution (dom. family)	40/122	80/141	25/131	40/109	30/104			
EPT Index	1	0	0	0	0			
Community Similarity Index	0.25	0.50	0.33	0.33	0			
Comments:								



